GASTROENTEROLOGY

ABSTRACTS AND CITATIONS

NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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CONTENTS

	Abstracts, Citations	Page
PRE-CLINICAL SCIENCES		
Morphology, Cellular Structure and Histochemistry	2629-2648	337
Absorption—Excretion—Transport	2649-2672	340
Motility	2673-2711	345
Secretion and Metabolism	2712-2719	350
Stomach	2720-2748	351
Pancreas	2749-2777	354
Hepatobiliary Tract	2778-2862	357
Intestine	2863-2892	367
General	2893-2948	372
DIAGNOSTIC PROCEDURES	2949-3018	380
GASTROINTESTINAL DISEASES		
Esophagus	3019-3041	388
Stomach	3042-3093	390
Peptic Ulcers	3094-3135	396
Small Intestine	3136-3166	401
Malabsorption	3167-3178	405
Large Intestine	3179-3205	407
Ulcerative Colitis	3206-3211	411
Pancreas	3212-3227	412
Pancreatitis	3228-3251	413
Liver and Biliary Tract	3252-3298	416
Hyperbilirubinemic States	3299-3301	421
Nonviral Hepatitis and Hepatic Injury	3302-3305	421
Acute Viral Hepatitis	3306-3328	422
Chronic Hepatitis	3329-3331	424
Alcoholic Liver Disease	3332-3335	424
Cirrhosis	3336-3351	425
Gallbladder and Biliary Tract Diseases	3352-3402	427
General	3403-3453	433
Parasitology	3454-3461	438
Regional Enteritis	3462-3469	439
AUTHOR INDEX		
SUBJECT INDEX		

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *International Standard ISO833, 1974*, are used. The two-letter state abbreviations are based on the United States Postal Service Code.

LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	ml, µl	milli-, microliter(s)
ADP	adenosine diphosphate	mm	millimeter(s)
AMP	adenosine monophosphate	mOsm	milliosmolar; milliosmeter(s)
amp	ampere	msec	millisecond(s)
ATP	adenosine triphosphate	mV	millivolt(s)
A	angstrom	min	minute(s)
BSP	sulfobromophthalein	MTD	maximum tolerated dose
C	degrees centigrade	NAD	nicotinamide adenine dinucleotide
cal	calories	NADH	reduced nicotinamide adenine dinucleotide
cc	cubic centimeter		
cm	centimeter(s)	NADP	nicotinamide adenine dinucleotidephosphate
dl	deciliter		
DNA	deoxyribonucleic acid	NADPH	reduced nicotinamide adenine dinucleotidephosphate
ED_{50}	median effective dose(s)		
EDTA	ethylenediamine tetraacetic acid	ng	nanogram (10^{-9})
e.g.	for example	nm	nanometer(s)
EEG	electroencephalogram	Pa	ambient pressure
ESR	erythrocyte sedimentation rate	PAS	periodic acid - Schiff
g	gram(s)	pg	picogram (10^{-12})
µg	microgram(s)	pgEq	picogram equivalent(s)
Hz	Hertz	p.o.	orally
hr	hour(s)	ppb	parts per billion
Ig	immunoglobulin(s)	ppm	parts per million
i.m.	intramuscular	r	Roentgen
i.p.	intraperitoneal	RBC	red blood cells (erythrocytes), red blood count
IU	international unit(s)		
i.v.	intravenous	resp.	respectively
kcal	kilocalorie(s)	RNA	ribonucleic acid
kg	kilogram(s)	s.c.	subcutaneous
K_m	Michaelis constant	sec	second(s)
LD_{50}	median lethal dose(s)	SGOT	serum glutamic-oxalacetic transaminase
LDH	lactic acid dehydrogenase		
m	meter(s)	SGPT	serum glutamic-pyruvic transaminase
M	molar; mole(s)		
mM	millimolar; millimole(s)	U	unit(s)
µM	micromolar; micromole(s)	UV	ultraviolet
ma	milliampere(s)	V	volt
mCi, µCi	milli-, microcurie(s)	WBC	white blood cells (leukocytes), white blood count
mEq	milliequivalent(s)		
mg	milligram(s)	yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

2629 ESTIMATION AND CHARACTERIZATION OF PROSTAGLANDINS IN THE HUMAN GASTROINTESTINAL TRACT. (Eng.) Bennett, A.; Stamford, I. F.; Stockley, H. L. (King's Coll. Medical Sch., Denmark Hill, London SE5 8RX, England). *Br. J. Pharmacol.* 61(4): 579-586; 1977.

To characterize the prostaglandin extracted from muscle and mucosa of various regions of the human gut, and to study prostaglandin synthetase extracted from colonic mucosa, prostaglandin-like material was extracted from muscle and mucosa of surgically removed human tissues and assayed against prostaglandin E_2 on strips of rat gastric fundus. Superfused human isolated gastric mucosa released prostaglandin-like material, and release was increased by stretching or clamping the tissue. The relative amounts of extracted biological activity were noted broadly as follows: gastric antral mucosa>colon muscle>gastric body mucosa=ileal mucosa>colon mucosa=gastric muscle= ileal muscle. Prostaglandins E and F were tentatively identified by chromatography and sensitivity to inactivation by alkali. Prostaglandin E apparently contributed most to the biological activity, possibly because the assay tissue is more sensitive to prostaglandin E than to F. Chromatography of gastric body mucosal extracts located material running with prostaglandin E_2 and a little with E_1. Colonic muscle and mucosal extracts contained material with relative front (R_F) values of prostaglandin E_1, E_2, E_3, and $F_{1\alpha}$, whereas $F_{2\alpha}$- and $F_{3\alpha}$-like substances were found only in the mucosa. The proportion of prostaglandin F varied from one specimen to another. The amount of extracted prostaglandin-like activity was increased by adding cofactors and arachidonic acid, and decreased by homogenization with acid-ethanol. The type and amount of activity generated from arachidonic acid by partly purified colonic mucosal prostaglandin synthetase depended on the substrate concentration.

2630 EFFECT OF CHRONIC ETHANOL INGESTION ON THE SMALL INTESTINAL ULTRASTRUCTURE IN RATS. (Eng.) Rossi, M. A.; Zucoloto, S. (Medical Sch. Ribeirao Preto, 14100, Ribeirao Preto, Sao Paulo, Brazil). *Beitr. Pathol.* 161(1):50-61; 1977.

The effect of chronic ethanol ingestion on small intestinal ultrastructure was studied in male Wistar rats. Rats maintained for 16 weeks on a supplemented solid semisynthetic diet plus ethanol, corresponding to 35% of the total caloric intake, developed ultrastructural changes in the small intestine as compared to pair-fed controls. The enterocytes from jejunal and ileal villi of the alcoholic animals exhibited conspicuous alterations of the mitochondria and both smooth and rough endoplasmic reticulum. The mitochondrial changes were characterized by enlargement, swelling, decreased matrical density, ruptured cristae, and occasional myelin figures. The smooth endoplasmic reticulum was dilated and apparently proliferated in a few epithelial cells. The rough endoplasmic reticulum appeared scarce, with fewer ribosomes attached to the cisternae. These findings provide further evidence that chronic ethanol consumption is important in the pathogenesis of small intestinal damage in rats. These changes could be responsible, at least in part, for the functional abnormalities commonly found in chronic alcoholism.

2631 INTESTINAL MUCOSAL CHANGES FOLLOWING INDUCED HYPOTHYROIDISM IN THE DEVELOPING RAT. (Eng.) Blanes, A.; Martinez, A.; Bujan, J.; Junquera, S. R. C.; Carballido, S. M. (Departamento de Anatomia Patologica del Hospital Clinico de S. Carlos, Universidad Complutense, Madrid, Spain). *Virchows Arch.* [*Pathol. Anat.*] 375(3):233-239; 1977.

Morphological changes in the small intestine were studied in neonatal, hypothyroid rats. Hypothyroidism was induced during the first 24 hr postnatally in Wistar rats by the injection of radioiodine (100 µCi, i.p.). Samples from duodenojejunal and ileocecal junctions were taken, and histologic, histomorphometric, and ultrastructural studies were carried out. The most prominent feature was the decrease of the villous height and total mucosal thickness in the hypothyroid animals in comparison with controls. At the electron microscopic level, the microvillous height was also markedly decreased. These changes probably represent a direct effect of hormonal deprivation upon the intestinal mucosa, combined with the effect that hypothyroidism may have on the villi.

2632 ULTRASTRUCTURAL EFFECTS OF PARACHLOROPHENYLALANINE, 5-HYDROXYTRYPTAMINE AND THE IMIPRAMINE GROUP ON THE NERVE PROCESSES OF THE SMALL INTESTINE. (Eng.) Feher, E.; Csanyi, K. (Semmelweis Univ. Medical Sch., Budapest, Hungary). *Acta Anat.* 100(1):61-67; 1978.

The structure of the nerve fibers in the isolated cat ileum was studied by fluorescence and electron microscopy after intraluminal treatment with imipramine group compounds, parachlorophenylalanine, and 5-hydroxytryptamine. Following treatment with parachlorophenylalanine (100 mg/kg/day, 5 days) and imipramine group compounds (30 mg/kg/day, 5 days), specific granules were selectively decreased ($p<0.001$) in number in the small intestinal nerve fibers. In concordance with ultrastructural observations, a marked diminution of fluorescence intensity was demonstrated in the small intestine. The number of the granular vesicles was significantly increased following 5-hydroxytryptamine treatment (500 mg/kg/day, as creatinine sulfate-H_2O complex, 5 days), and yellow fluorescent neurons and processes were observed in the myenteric and submucous plexuses. These observations demonstrate the serotoninergic nature of certain nerve fibers.

2633 CARCINOEMBRYONIC ANTIGEN (CEA) IN THE NORMAL HUMAN SMALL INTESTINE: A LIGHT AND ELECTRON MICROSCOPIC STUDY. (Eng.) Isaacson, P.; Judd, M. A. (General Hosp., Southampton, England). *Gut* 18(10):786-791; 1977.

To examine the localization of carcinoembryonic antigen (CEA) in the normal small intestine, an immunoperoxidase method was applied to formalin-fixed paraffin-embedded and glutaraldehyde-fixed resin-embedded sections of human small intestine. CEA was easily demonstrated coating the surface of the small intestine, lining the crypts, and in goblet cells, indicating its presence there in considerable concentration. At the ultrastructural level, CEA was localized in the glycocalyx and in mucin granules of goblet cells but not intracytoplasmically. The restriction of CEA staining to the goblet cells and the glycocalyx suggests that the glycocalyx, or part of it, may be derived from the goblet cell.

2634 DISTRIBUTION OF INTRINSIC FACTOR-VITAMIN B_{12} RECEPTORS IN HUMAN INTESTINE. (Eng.) Hagedorn, C. H.; Alpers, D. H. (Washington Univ. Sch. Medicine, St. Louis, MO 63110). *Gastroenterology* 73(5):1019-1022; 1977.

A new rapid and accurate method for detecting vitamin B_{12}-intrinsic factor (IF-B_{12}) receptors is described, and this method was used to study the distribution of mucosal IF-B_{12} receptors in three human small intestines. A microfuge technique was used to detect the IF-B_{12} receptor; in this method, the sample was diluted after incubation, obviating washing, and multiple samples were processed at the same time. This technique was compared with the Millipore filter method, and a good correlation was observed; similar values for bound B_{12} were obtained, over a range of B_{12} concentrations, when the two techniques were used on identical samples. Using the new method, IF-B_{12} receptors in human intestine were found to be present in significant amounts in the entire distal three-fifths of intestine. Triokinase activity was absent in the distal two-fifths of intestine, and tryptophan oxygenase was present only in the distal one-sixth, or most terminal part of the ileum. These data suggest that (a) biochemical functions in the ileum have different anatomical distributions, (b) IF-B_{12} receptors correspond most closely with the accepted anatomical definitions of the ileum, and (c) vitamin B_{12} malabsorption seen in resection or disease of the terminal ileum may not be attributable solely to a deficiency of ileal receptors.

2635 AN ELECTRON MICROSCOPIC STUDY OF INTRA-EPITHELIAL LYMPHOCYTES IN HUMAN FETAL SMALL INTESTINE. (Eng.) Orlic, D.; Lev, R. (New York Medical Coll., Basic Science Bldg., Valhalla, NY 10595). *Lab. Invest.* 37(6):554-561; 1977.

To study intra-epithelial lymphocytes in the human fetal small intestine, small intestine was obtained from 8- to 20-week fetuses, and the tissues were examined by electron microscopy. Lymphocytes were present as isolated cells in the mucosal mesenchyme as early as the 8th week of intra-uterine life and were found, in increasing numbers, in the epithelium of specimens obtained from 11- to 20-week-old fetuses. All intra-epithelial lymphocytes were located in the lateral spaces between contiguous columnar cells. Some displayed cytoplasmic pseudopods and were thought to migrate within the extracellular spaces of the epithelial layer. Surface invaginations and cytoplasmic vesicles in fetal lymphocytes suggested that these cells were capable of pinocytotic activity. Intra-epithelial lymphocytes in fetal gut may be able to sample ingested foreign substances in swallowed amniotic fluid in a manner similar to that previously proposed for intra-epithelial lymphocytes in the ileum of young adult chickens.

2636 ULTRASTRUCTURAL IDENTIFICATION OF A NEW CELL TYPE--THE N-CELL AS THE SOURCE OF NEUROTENSIN IN THE GUT MUCOSA. (Eng.) Helmstaedter, V.; Feurle, G. E.; Forssmann, W. G. (Anatomisches Institut und Medizinische Poliklinik der Universitat Heidelberg, Heidelberg, W. Germany). *Cell Tissue Res.* 184(4):445-452; 1977.

Neurotensin cells were identified immunohistochemically and ultrastructurally by differential counting of endocrine cells in the small intestines of primates (*Tupaia belangeri*). Using light microscopy, the enterochromaffin (EC) cells were identified by the Masson-Fontana silver stain; with the same method the neurotensin cells were not stained. The other endocrine cells were quantified using the peroxidase-antiperoxidase stain with antisera against glucagon, somatostatin, cholecystokinin, gastrin, secretin, pancreatic polypeptide, gastric inhibitory peptide, and neurotensin. In the ileal mucosa, the most frequent endocrine cell was the EC cell, followed by the glucagonoid cell (L cell). The immunoreactive neurotensin cell was the third most frequent endocrine cell in this region. Ultrastructurally, this cell was found to contain electron dense secretory granules measuring 335 ± 87 nm in diameter.

2637 HISTOCHEMICAL AND ULTRASTRUCTURAL IDENTIFICATION OF NEUROTENSIN CELLS IN THE DOG ILEUM. (Eng.) Frigerio, B.; Ravazola, M.; Ito, S.; Buffa, R.; Capella, C.; Solcia, E.; Orci, L. (Histochemistry and Ultrastructure Center, Univ. Pavia at Varese, Viale L. Borri 57, I-21100 Varese, Italy). *Histochemistry* 54(2):123-131; 1977.

Neurotensin immunoreactive cells were investigated histochemically and ultrastructurally in the dog ileum, with special reference to their relation with other endocrine cells in the mucosa of the lower small intestine. Neurotensin cells that were stained with immunofluorescence or immunoperoxidase proved distinct from argentaffin (EC) cells, glucagon immunoreactive (GLI) cells, and pancreatic peptide immunoreactive (PP) cells. Neurotensin cells showed various degrees of reactivity with Grimelius silver. With electron microscopy, large granule

cells with a thin peripheral rim of Grimelius-reactivity (L cells) and large granule cells with variable Grimelius-reactivity of the core (N cells) were found in addition to EC cells. On the basis of their distribution, L cells were identified with GLI cells, and N cells were interpreted to be neurotensin cells.

2638 ANATOMY AND RADIOLOGY OF THE AREAE GASTRICAE. (Eng.) Mackintosh, C. E.; Kreel, L. (Royal Free Hosp., Middlesex, England). *Gut* 18(11):855-864; 1977.

The anatomy and radiology of the areae gastricae were studied in human and pig stomach specimens to create a meaningful clinical picture of the anatomy of the gastric mucosa for the rational interpretation of the double-contrast barium meal. By coating isolated stomach sections with barium from a syringe, a barium groove pattern was observed that corresponded with the anatomical groove pattern in the human and pig. This pattern was distinctive in the anatomical antrum, body, and fundus of the stomach. The mosaic pattern in the antrum was relatively fine with a short distance between the grooves and, on occasion in the magnified image, there was an impression of a punctate pattern between the grooves themselves. In the anatomical body of the stomach containing the fundic glands, the grooves were much wider and further apart with a coarse mosaic quite different from the antral mucosa; a punctate pattern between the grooves was not clearly seen. The anatomical fundus had a groove pattern intermediate in coarseness between the antrum and body of the stomach. In 272 double-contrast barium meals in humans, the antral areae pattern was graded from 1-4, i.e., average distance between grooves 1, 2, 3, or 4 mm, with nonvisualization graded as 0. It was found that 35% of the duodenal ulcer cases had a grade 4 pattern in the antrum, and less than 3% of the duodenal ulcers occurred in the nonvisualized group. The inference is that the non-coater has a thick barrier mucus layer and a low duodenal ulcer incidence, that is in keeping with experimental work on rats showing that drugs that promote ulcer healing increase mucus secretion. It was also shown that the success of the barium coating to show the area gastricae depends on the type of barium used and the thickness of the barium coat itself in addition to the thickness of the mucus layer.

2639 MORPHOLOGICAL STUDY OF THE PANETH CELL: PANETH CELLS IN INTESTINAL METAPLASIA OF THE STOMACH AND DUODENUM OF MAN. (Eng.) Matsubara, F. (Yamaguchi Univ. Sch. Medicine, Kogushi, Ube, Yamaguchi Pref. 755, Japan). *Acta Pathol. Jpn.* 27(5):677-695; 1977.

To clarify the physiological significance of the Paneth cells, these cells were studied ultrastructurally in the duodenum and in intestinal metaplasia of stomach in 173 patients, and the fine structures of the cells were compared. Paneth cells showed the ultrastructure of serozymogenic cells and secreted their secretory granules by a merocrine process. Rod-shaped or tubular dense bodies were observed in the apical region of some Paneth cells, and these may have some relation to the secretion of the secretory granules. Secretory granules with a less dense layer in the periphery were also observed. Cells morphologically intermediate between the Paneth cell and the goblet cell were found. Some of the Paneth cells might be phagocytized by undifferentiated crypt cells. The Paneth cells in intestinal metaplasia were morphologically similar to those in duodenum. However, phagolysosomes in the lower cytoplasm were observed more frequently in the Paneth cells of the duodenum than in those found in gastric metaplasia.

2640 QUANTITATIVE ELECTRON MICROSCOPICAL STUDIES ON IN VITRO INCUBATED RABBIT GALLBLADDER EPITHELIUM. (Eng.) Blom, H.; Helander, H. F. (Dept. Anatomy, Univ. Umea, S-901 87 Umea, Sweden). *J. Membr. Biol.* 37(1):45-61; 1977.

Water and electrolyte transport were studied in pieces of rabbit gallbladder incubated *in vitro* for 1 hr in Ringer's solution at 37 C (transporting epithelium), or in Ringer's containing 1 mM ouabain (inhibited epithelium). The tissues were fixed in 2% glutaraldehyde, postfixed in OsO_4, and embedded in Epon. Stereological analysis was carried out on electron micrographs. In the transporting epithelium, the epithelial cell height averaged 28 μm in the crests and 18 μm in the crypts. The nucleus, mitochondria, paracellular channels, lateral plasma membrane, and apical membrane in the crests averaged 16.9% of cell volume, 18.7% of cytoplasmic volume, 28.3% of epithelial volume, 4.1 m^2/cm^3 of cell volume, and 0.5 m^2/cm^3 of cell volume, resp.; in the crypts, the corresponding figures were 18.7%, 14.1%, 11.0%, 2.9 m^2/cm^3, and 0.6 m^2/cm^3. The paracellular channels appeared as interconnected tissue sheets of varying width; they were broader in the basal portion of the epithelium than in the apical portion; however, immediately above the basement membrane the channels became very narrow. The arithmetic mean width of the channels was 0.9 and 0.2 μm in the crests and crypts, resp.; and their length was in the range of 40-120 μm. These stereological data are compatible with the standing gradient model for water transport. The ouabain-inhibited cells were swollen and had collapsed paracellular channels. Although it cannot be ruled out that volume changes occurred in the cells and the paracellular channels during the tissue processing, qualitatively similar morphology was observed by light microscopy of transporting and inhibited gallbladder epithelium fixed by freeze-drying and embedded in Epon. This indicates the presence of such channels in the *in vitro* transporting rabbit gallbladder epithelium.

2641 THE ULTRASTRUCTURE OF HUMAN CHOLANGIOLAR CELLS [Abstract]. (Eng.) Min, K. W.; Gyorkey, P.; Gyorkey, F. (Veterans Admin. Hosp., Houston, TX 77211). *Fed. Proc.* 37(3):303; 1978.

2642 ISOLATION AND IMMUNOHISTOCHEMICAL LOCALIZATION OF A COMPONENT OF BASEMENT MEMBRANE

COLLAGEN IN HUMAN LIVER [Abstract]. (Eng.) Biempica, L.; Morecki, R.; Wu, C. H.; Giambrone, M. A.; Rojkind, M. (Albert Einstein Coll. Medicine, Bronx, NY). *Gastroenterology* 73(5):1213; 1977.

2643 THIRD DIVISION OF THE AUTONOMIC NERVOUS SYSTEM. AN IMPORTANT ELEMENT IN GUT CONTROL [Abstract]. (Eng.) Bishop, A. C.; Polak, J. M.; Buchan, A. M. J.; Bloom, S. R.; Pearse, A. G. E. (Royal Postgraduate Medical Sch., London, England). *Gut* 18(11):A962-A963; 1977.

2644 TOTAL NUMBER OF GASTRIN CELLS IN THE NORMAL HUMAN STOMACH AND IN PEPTIC ULCER PATIENTS [Abstract]. (Eng.) Willems, G.; Keuppens, F. (Eenheid voor gastro-enterologisch Onderzoek, Vrije Universiteit, Brussels, Belgium). *Rend. Gastroenterol.* 9(1):59; 1977.

2645 RESOLVING BIOCHEMICALLY THE HEPATOCYTE'S MULTIFUNCTIONAL PERICELLULAR MEMBRANE. (Eng.) Evans, W. H. (Natl. Inst. Medical Res., Mill Hill, London, England). *Trends Biochem. Sci.* 2(8):169-171; 1977.

2646 MORPHOLOGICAL AND CYTOLOGICAL RESEARCH ON THE LIVER OF THE HUMAN EMBRYO AND FETUS [Abstract]. (Eng.) Batistic, B.; Velfl, D. (Medical Faculty, Rijeka, Yugoslavia). *Acta Anat. (Basel)* 99(1):87-88; 1977.

2647 HEPATIC FINE STRUCTURAL CHANGES IN AGING FISCHER 344 RATS [Abstract]. (Eng.) Schmucker, D. L.; Mooney, J. S.; Jones, A. L. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5, Part 2):1127; 1977.

2648 THE BILE DUCTS. (Eng.) Menuck, L.; Amberg, J. (Veterans Admin. Hosp., La Jolla, CA). *Radiol. Clin. North Am.* 14(3):499-525; 1976.

See also, 2711, 2753, 2755, 2764, 2773, 2781, 2801, 2839, 2868, 2869, 2885, 2886, 2898, 2910, 2926, 2927, 2933, 2935, 2940, 3013, 3042, 3056, 3069, 3095, 3099, 3133, 3143, 3156, 3208, 3261, 3262, 3384.

ABSORPTION - EXCRETION - TRANSPORT

2649 ISOLATED MEMBRANE VESICLES AS TOOLS FOR ANALYSIS OF EPITHELIAL TRANSPORT. (Eng.) Hopfer, U. (Sch. Medicine, Case Western Reserve Univ., Cleveland, OH 44106). *Am. J. Physiol.* 233(6):E445-E449; 1977.

Vesicles of the isolated brush border and basolateral plasma membranes were used in studies of intestinal transport to provide information on mechanisms of solute translocation across both plasma membranes, coupling of Na^+ and nonelectrolyte transport in the brush border membrane, kinetics of the nonelectrolyte transport under controlled *cis* and *trans* conditions, and analysis of transport changes associated with different physiological or pathological conditions. The mechanisms of translocation of D-glucose and a neutral amino acid are presented as the examples of nonelectrolytic transport. It was found that Na^+ stimulated the transport of L-valine and D-glucose in brush border membranes. Further observations suggested that Na^+ is the only ion directly involved in nonelectrolyte transport. D-glucose translocations across the membrane fall into the category of "facilitated diffusion." The difference between the transport mechanisms in the brush border and the basolateral plasma membrane is the requirement for a cosubstrate in the former. The kinetic parameters of the Na^+-dependent glucose system, determined with an equilibrium exchange procedure, indicate that Na^+-glucose-loaded carrier has a significantly higher translocation rate than the carrier loaded only with D-glucose. Semistarvation of animals from which brush border membranes were isolated increased the activity of L-valine transport, which may explain the elevated amino acid transport seen in an intact epithelium. Semistarvation had no effect on the D-glucose transport rate. The experiments discussed illustrate that the advantage of the vesicular system preparations over preparations of intact intestinal cells or tissues is their ability to control the composition of the environment on both sides of the membrane and, thereby, the transmembrane gradients.

2650 EFFECT OF DAILY ETHANOL INGESTION ON INTESTINAL PERMEABILITY TO MACROMOLECULES. (Eng.) Worthington, B. S.; Meserole, L.; Syrotuck, J. A. (Nutrition Div., Univ. Washington, Child Development Mental Retardation Center, WJ-10, Seattle, WA 98195). *Am. J. Dig. Dis.* 23(1):23-32; 1978.

The effects of regular ethanol ingestion on morphological and permeability characteristics of the small intestine were assessed in mature female Sprague-Dawley rats. Thirty adult rats were divided into two groups and provided a standard commercial diet in pellet form. Each morning, after an overnight fast, every animal in the experimental group was administered an aliquot of 20% ethanol by gavage; animals in the control group were provided aliquots of 20% sucrose in water by the same method. After 4 and 8 weeks on the gavage routine (and 10

days and 4 weeks after gavage cessation), jejunal permeability to horseradish peroxidase was examined in animals from each group. Using a routine ligated-loop procedure and light and electron microscopy, ethanol-exposed rats demonstrated increased intestinal permeability to horseradish peroxidase by 4 weeks; sucrose-exposed animals revealed little alteration in mucosal integrity. It is proposed that regular ingestion of sizable amounts of alcohol alters morphological characteristics of the gut and increases the permeability of the mucosa to "undigested" macromolecules.

2651 EFFECTS OF ETHANOL ON SODIUM, 3-O-METHYL GLUCOSE, AND L-ALANINE TRANSPORT IN THE JEJUNUM. (Eng.) Kuo, Y. J.; Shanbour, L. L. (Univ. Texas Medical Sch. at Houston, Houston, TX 77030). *Am. J. Dig. Dis.* 23(1):51-56; 1978.

The effects of ethanol on Na^+, Cl^-, 3-*O*-methyl glucose (3-*O*-MG), and L-alanine fluxes were studied in the isolated rabbit jejunal mucosa. Ethanol (3% volume/volume present on both sides of the mucosa) decreased electrical potential difference (PD), short-circuit current (I_{SC}) and inhibited active transport of Na^+, 3-*O*-MG, and L-alanine. This concentration also increased the permeability of the mucosa for Cl^-, 3-*O*-MG, and L-alanine. Ethanol at 5.4% potentiated the effects on PD, I_{SC}, and the permeability for electrolytes and organic substances. These effects of ethanol could not be fully explained by an osmotic action. The results suggest that ethanol, by inhibiting intestinal absorption of Na^+, 3-*O*-MG, and L-alanine and enhancing possible fluid loss through increased permeability, may produce an effective nutritional deficiency even with adequate dietary intake.

2652 AMINO ACID TRANSPORT IN BRUSH-BORDER-MEMBRANE VESICLES ISOLATED FROM HUMAN SMALL INTESTINE. (Eng.) Lucke, H.; Haase, W.; Murer, H. (Max-Planck-Institut fur Biophysik, Kennedyallee 70, 6000 Frankfurt [Main], W. Germany). *Biochem. J.* 168(3):529-532; 1977.

L-alanine and L-phenylalanine uptake by purified brush border membrane vesicles isolated from human small intestine was investigated using a rapid-filtration technique. L-alanine entered the same osmotically reactive space as D-glucose, indicating that transport into the vesicles rather than binding to the membranes was occurring. The uptake rate for L-alanine was higher in the presence of a Na^+ gradient than in the presence of a K^+ gradient. In the presence of a Na^+ gradient, the lipophilic anion SCN^- caused an increase in L-alanine transport, whereas the nearly impermeant SO_4^{2-} anion decreased the uptake of L-alanine compared with its uptake in the presence of Cl^-. The uptake of L-phenylalanine into the brush border membrane vesicles was also stimulated by Na^+. The results indicate that Na^+ and neutral amino acids are cotransported in the human intestinal brush border membrane.

2653 ASCORBIC ACID FLUX ACROSS MUCOSAL BORDER OF GUINEA PIG AND HUMAN ILEUM. (Eng.) Mellors, A. J.; Nahrwold, D. L.; Rose, R. C. (Milton S. Hershey Medical Center, Pennsylvania State Univ., Hershey, PA 17033). *Am. J. Physiol.* 233(5): E374-E379; 1977.

The unidirectional influx of L-[^{14}C]ascorbic acid across the mucosal border of guinea pig and human ileum was determined. Influx was found to follow saturation kinetics, indicating that a carrier mechanism is operative. The maximal influx in guinea pig ileum bathed in Ringer solution was 140 nmol/cm^2/hr, and the ascorbic acid concentration required to give a half-maximal influx (K_m) was 1.0 mM. At mucosal ascorbic acid concentrations greater than 6 mM, or when the tissue was bathed in Na-free media, influx was approximately linearly related to the ascorbic acid concentration, and absorption by simple diffusion may predominate. With a mucosal ascorbic acid concentration of 0.28 mM, influx was reduced by at least 70% when Na-free media was used; however, influx was not dependent on the intracellular Na concentration. The brush border mechanism appears to be stereospecific and not closely coupled to cellular metabolism. A model of transport is favored that features a carrier-mediated transport mechanism for simultaneous entry of ascorbic acid and Na across the brush border. This model is similar in nature to, but functionally distinct from, the sodium-gradient mechanism postulated to effect sugar and amino acid transport in mammalian ileal mucosa.

2654 CHARACTERIZATION AND EFFECT OF PHOSPHOLIPID ON BILE ACID ABSORPTION BY VILLI ISOLATED FROM HAMSTER SMALL INTESTINE. (Eng.) Fondacaro, J. D.; Rodgers, J. B. (Univ. Cincinnati Coll. Medicine, 231 Bethesda Ave., Cincinnati, OH 45267). *Am. J. Dig. Dis.* 23(1):12-17; 1978.

The effects of phospholipid on absorption of bile acids by hamster small intestine were studied to determine if this compound inhibits absorption of bile acids. Taurocholic and cholic acid absorption was studied using a new *in vitro* technique that relates uptake rates to the weight of the villi present on the intestinal sample rather than to the weight of the entire segment of intestine used for the study. This procedure removes from consideration various components of the intestinal wall that are not directly involved with the absorptive process. Using radioactive techniques, absorption of each type of bile acid was determined over a broad range of concentrations both in the presence and absence of phospholipid in the incubation medium. Absorption of taurocholic acid by the jejunal villi was determined to be a passive process, as previously reported. Villi from the ileum absorbed both bile acids by an apparent active process when initial concentrations of bile acids were below 2.0 mM. Above this concentration, bile acid absorption by the ileum appeared to be mainly passive. Phospholipid inhibited bile acid absorption by the ileum when initial bile acid concentrations were moderately

high. However, at low substrate concentration, phospholipid has no appreciable effect on bile acid transport.

2655 DISTRIBUTION AND CONTENT OF MICROTUBULES IN RELATION TO THE TRANSPORT OF LIPID. AN ULTRASTRUCTURAL QUANTITATIVE STUDY OF THE ABSORPTIVE CELL OF THE SMALL INTESTINE. (Eng.) Reaven, E. P.; Reaven, G. M. (Stanford Univ. Sch. Medicine, Palo Alto, CA 94304). *J. Cell Biol.* 75(2, Part 1):559-572; 1977.

To determine whether microtubules are linked to intracellular transport in absorptive cells of the proximal intestine, microtubule distribution and content were determined in cells from fasting and fed female Sprague-Dawley rats. The animals received a meal of standard chow that was consumed during a 1-hr period, and tissue was taken from the mid-jejunum before, and 0.5 hr and 6 hr after the meal. The microtubule content of apical, Golgi, and basal regions of cells was quantitated by point-counting stereology. Microtubules were localized in intracellular regions of enterocytes (apical and Golgi areas) previously shown to be associated with lipid transport. The microtubule content within apical and Golgi regions was significantly ($p<0.01$) reduced during transport of foodstuffs. To determine the effect of inhibition of microtubule assembly on transport, colchicine or vinblastine sulfate was administered to postabsorptive rats, and the lipid and microtubule content of enterocytes determined 1 and 3 hr later. After treatment with these agents, lipid was found to accumulate in apical regions of the cells; this event was associated with a significant reduction in microtubule content. The regional distribution of microtubules in enterocytes, the decrease in assembled microtubules after a fat-containing meal, and the accumulation of lipid after the administration of antimicrotubule agents suggest that microtubules are related to lipid transport in enterocytes.

2656 EFFECTS OF DIHYDROXY BILE ACIDS AND HYDROXY FATTY ACIDS ON THE ABSORPTION OF OLEIC ACID IN THE HUMAN JEJUNUM. (Eng.) Wanitschke, R.; Ammon, H. V. (I. Med. Klinik. d. Universitat, Langenbeck Str. 1, 6500 Mainz, W. Germany). *J. Clin. Invest.* 61(1):178-186; 1978.

Perfusion studies of the normal human jejunum were carried out in healthy men to determine whether dihydroxy bile acids and hydroxy fatty acids inhibit oleic acid absorption. Deoxycholate (3 mM) and glycodeoxycholate (7 mM) inhibited the absorption of 3 mM oleic acid in isotonic micellar solutions while inducing net fluid secretion. Similarly, fractional absorption of oleic acid decreased in the presence of hydroxy fatty acids. However, only the changes induced by 2 mM ricinoleic acid could be distinguished from changes induced by an increase in total fatty acid concentration. Under all experimental conditions, close linear relationships existed between net water movement and fractional absorption of glucose, xylose, and fatty acids, as well as between the absorption rates of these solutes. In contrast, net fluid secretion induced by hypertonic D-mannitol (450 mOsm/l) had no effect on solute absorption. The observations help explain the malabsorption of fat and other nutrients in patients with the blind loop syndrome.

2657 EFFECTS OF LONG CHAIN FATTY ACIDS ON SOLUTE ABSORPTION: PERFUSION STUDIES IN THE HUMAN JEJUNUM. (Eng.) Ammon, H. V.; Thomas, P. J.; Phillips, S. F. (Veterans Admin. Center, Wood, WI 53193). *Gut* 18(10):805-813; 1977.

Perfusion studies were carried out in healthy volunteers to test the hypothesis that net fluid secretion induced by fatty acids is accompanied by parallel reduction in solute transport. Ricinoleic acid ($\geq$2 mM) provoked a marked net secretion of fluid and concomitantly inhibited the absorption of all solutes tested (glucose, xylose, L-leucine, L-lysine, folic acid, and 2-mono-olein). Oleic acid ($\leq$5 mM) also reduced net fluid and solute transport, but was less potent in reducing solute absorption than was ricinoleic acid. When fluid secretion was induced osmotically with mannitol, glucose and xylose absorption was not affected. The mechanism for this generalized effect of fatty acids on solute absorption is uncertain, possibly nonspecific, and might be related to mucosal damage and altered mucosal permeability induced by these agents.

2658 CALCIUM TRANSPORT IN DISPERSED ACINAR CELLS FROM RAT PANCREAS. (Eng.) Gardner, J. D.; Hahne, W. F. (Bldg. 10, Rm. 9D-15, Natl. Inst. Health, Bethesda, MD 20014). *Biochim. Biophys. Acta* 471(3):466-476; 1977.

Studies were carried out to elucidate the basis for the discrepancy between the results of one study in which cholecystokinin and cholinergic agents were found to increase uptake of ^{45}Ca by dispersed acinar cells from rat pancreas, and results of other studies in which cholecystokinin and cholinergic agents did not alter or cause a slight decrease in ^{45}Ca uptake by pancreatic acinar cells. In the present study, increased uptake of ^{45}Ca by acinar cells incubated with cholecystokinin occurred only in cells washed with iced, 160 mM choline chloride. This increased uptake reflected increased cellular uptake of radioactivity from the wash solution but not from the incubation medium. Cholecystokinin had no effect on uptake of ^{45}Ca by cells washed with 160 mM choline chloride, containing 5 mM ethylenediaminetetraacetate, or by cells washed with Krebs-Ringer bicarbonate. Furthermore, cells washed with 160 mM choline chloride accumulated a substantial amount of ^{45}Ca from the wash solution, and this accumulation was increased in cells that had been preincubated with cholecystokinin. Cells washed with Krebs-Ringer bicarbonate did not take up ^{45}Ca from the wash solution.

2659 INTESTINAL OSMOLALITY AND CARBOHYDRATE ABSORPTION IN RATS TREATED WITH POLY-

MERIZED GLUCOSE. (Eng.) Daum, F.; Cohen, M. I.; McNamara, H.; Finberg, L. (North Shore Univ. Hosp., 300 Community Drive, Manhasset, NY 11030). *Pediatr. Res.* 12(1):24-26; 1978.

The intestinal osmolal physiology and absorption of comparable preparations of polymerized glucose and of glucose were evaluated in isolated segments of rat duodenum. The acute rise in the osmolality of the succus entericus after 5% polymer injections (298 mOsm/kg at 3 min, 311 mOsm/kg at 30 min) was significantly less than that noted after 5% glucose (387 mOsm/kg at 3 min, 351 mOsm/kg at 30 min). At 60 min, a steady state had been established, and no significant difference was found. Injections of 10% polymer were superior to those of 10% glucose, as they also produced a lower luminal osmolality (351 mOsm/kg versus 427 mOsm/kg at 30 min). Luminal polyethylene glycol concentrations revealed comparable increases in intraluminal water content after 10% polymer and 5% glucose (22% versus 25% at 30 min) injections. After polymer injections, four times as much glucose was present in the mucosa as in the succus, whereas after 5% glucose injections, a high concentration of glucose remained in the succus. These results indicate that polymer solutions produce lower luminal osmolality than glucose solutions of similar weight. In addition, enhanced glucose absorption by the mucosal cell is suggested in animals injected with polymer. Polymerized glucose should, therefore, provide twice the calories of glucose without a disparate increase in the intestinal osmolality and intraluminal diffusion of extracellular water. Because of these properties, such a polymer may be useful in the p.o. nutritional rehabilitation of neonates and infants with diarrhea.

2660 RATES AND MECHANISMS OF GLUCOSE, GALACTOSE, AND XYLOSE ABSORPTION IN MAN IN VIVO. (Eng.) Cook, G. C. (Hosp. for Tropical Diseases, 4 St. Pancras Way, London NW1 OPE, England). *Scand. J. Gastroenterol.* 12(6):733-737; 1977.

Jejunal absorption rates of glucose, galactose, and xylose were determined consecutively in six Arab subjects *in vivo*. A double-lumen tube perfusion technique was used, and the perfusion solutions contained 200 mM of each monosaccharide. The mean xylose absorption rate (0.63 mmol/30 cm jejunum/min) was significantly lower than that for glucose ($p<0.001$) and galactose ($p<0.001$). To investigate evidence that glucose and xylose share the same jejunal transfer mechanism, their absorption rates when given alone and together, at high concentrations, were determined in six other Arabs; perfusion solutions contained 200 mM glucose, 100 mM xylose, and 200 mM glucose plus 100 mM xylose. The rates of glucose and xylose absorption were not significantly influenced by the other monosaccharide. This study does not confirm the existence of a common transfer mechanism. A significant correlation between absorption rate of glucose and the weight of xylose excreted after a 25 g p.o. load ($p<0.05$) was demonstrated.

2661 PUROMYCIN INHIBITION OF CHOLESTEROL ABSORPTION IN THE RAT. (Eng.) Vahouny, G. V.; Ito, M.; Blendermann, E. M.; Gallo, L. L.; Treadwell, C. R. (George Washington Univ., Sch. Medicine and Health Sciences, Washington, DC 20037). *J. Lipid Res.* 18(6):745-752; 1977.

The effect of puromycin on intestinal cholesterol absorption was studied in rats with indwelling catheters in the left thoracic lymphatic duct. Puromycin administration (15 mg, i.p., over 9 hr) to female Wistar rats produced a marked depression of cholesterol absorption (from 23.5% of administered dose in controls to 7.5% in treated rats) under conditions where the absorption of simultaneously administered fatty acid was also dramatically inhibited (40% that of controls). The same treatment of male rats also produced a significant depression in cholesterol absorption (14% of administered dose in treated animals), but was without effect on absorption of the fatty acid. Despite the depressions of lipid absorption in puromycin-treated animals, there was no accumulation of either cholesterol or fatty acid in the intestinal mucosa of either sex. Actinomycin D treatment (1 mg/kg) of fasting male and female rats (receiving constant infusions of saline) had no effect on the rate of lymph production. This finding suggests that altered lymph production was not responsible for the depressed lipid absorption observed in fed animals treated with protein synthesis inhibitors. The selective inhibition of cholesterol absorption in male rats also precludes the possibility that the major effect of the inhibitor is on delayed gastric emptying.

2662 INHIBITION OF FOLATE ENZYMES BY SULFASALAZINE. (Eng.) Selhub, J.; Dhar, G. J.; Rosenberg, I. H. (Univ. Chicago, Pritzker Sch. Medicine, Chicago, IL 60637). *J. Clin. Invest.* 61(1):221-224; 1978.

To further explore the mechanism of sulfasalazine action, the interaction of the drug with the folate recognition site was tested with three enzymes: dihydrofolate reductase, methylenetetrahydrofolate reductase, and serine transhydroxymethylase, each catalyzing a reaction involving a different folate derivative. Each of these enzymes was inhibited by sulfasalazine in the same concentration range as that previously observed to inhibit intestinal folate transport (0.4-1.0 mM); the kinetic data were consistent with a competitive mode of inhibition. Specificity of inhibition was demonstrated by the finding that the reduction of the pteridine ring of pteroylheptaglutamic acid by dihydrofolate reductase was subject to inhibition, whereas the hydrolysis of the γ-glutamyl peptide side chain by chicken pancreas conjugase was not affected. These results suggest that sulfasalazine interferes with a folate recognition site that is common to these enzymes and to the intestinal transport system. Sulfasalazine, therefore, has certain properties of an antifolate drug.

2663 EFFECT OF FOLATE DEFICIENCY AND ETHANOL INGESTION ON INTESTINAL FOLATE ABSORPTION. (Eng.) Racusen, L. C.; Krawitt, E. L. (Dept. Med-

icine, Univ. Vermont, Burlington, VT 05401). *Am. J. Dig. Dis.* 22(10):915-920; 1977.

The effects of folate deficiency, generalized malnutrition, and alcohol ingestion on jejunal transport, mucosal uptake, and reduction of folic acid were evaluated in male Sprague-Dawley rats. As measured by an everted gut sac technique, a folate-deficient diet fed *ad libitum* did not alter transport of mucosal uptake of folate. Partial starvation, which was produced in rats pair-fed with animals ingesting ethanol (20% in drinking water, 2 weeks), increased jejunal folate transport and mucosal uptake in animals ingesting either a folate-deficient or control diet (5.5 mg folate/kg diet). Ethanol ingestion by rats consuming folate-deficient or control diets resulted in transport and mucosal uptake rates intermediate in value compared to those from *ad libitum* fed and pair-fed groups. No differences in reduction of folic acid were found. These results suggest that folate depletion and ethanol ingestion, alone or in combination, do not affect the ability of the rat jejunum to transport folate, but that partial starvation results in an increase in folate transport activity.

2664 A pH-DEPENDENT, CARRIER-MEDIATED TRANSPORT SYSTEM FOR THE FOLATE ANALOG, AMETHOPTERIN, IN RAT JEJUNUM. (Eng.) Strum, W. B. (10666 N. Torrey Pines Rd., La Jolla, CA 92037). *J. Pharmacol. Exp. Ther.* 203(3):640-645; 1977.

To investigate the mechanism of intestinal folate transport, transport of the folate analog, amethopterin, was studied in the rat using everted intestinal sacs and radiolabeled drug. After an initial lag period, the transport rate for amethopterin (0.5 μM) was linear for 60 min with a rate of 8.7 pmol/min/sac at pH 6.0 and 1.36 pmol/min/sac at pH 7.4. Chromatography confirmed that amethopterin was not altered after transport from the mucosa to the serosa. At pH 6.0, the transport system was saturable with a K_m of 2.8 μM and V_{max} of 66 pmol/min/sac; at pH 7.4, the system was not saturable. Accumulation of amethopterin (0.1 μM) against a chemical gradient was observed in jejunal, but not ileal, sacs and was pH dependent. Transport inhibition at pH 6.0 was produced by hydroxylamine, azide, fluoride, dinitrophenol, iodoacetate, and p-chloromercuriphenylsulfonate treatment, and by the absence of oxygen; this effect was not observed at pH 7.4. The transport of amethopterin was also inhibited by folate, 5-formyltetrahydrofolate, and 5-methyltetrahydrofolate. The inhibition constant for folate (K_I=2.6 μM) was similar to the K_m value for amethopterin transport. Inhibition of amethopterin transport by folate was competitive, as shown by the effect of various concentrations of folate on the transport rate of two different concentrations of amethopterin. Of the two reduced compounds tested, 5-formyltetrahydrofolate (K_I=2.0 μM) was a slightly more effective inhibitor than 5-methyltetrahydrofolate (K_I=3.3 μM). Additional analysis of the inhibitory process was obtained by determining the effect of 10 mM iodoacetate and 50 μM folate at pH 5.5 to 7.5; the response was observed to be pH-dependent with a maximal effect at pH 6.0. These data are consistent with a pH-dependent, carrier-mediated transport system for the folate analog, amethopterin, in the rat jejunum.

2665 EFFECT OF SYSTEMIC BACTERIAL INFECTION ON ABSORPTION RATES OF L-HISTIDINE AND GLYCYLGLYCINE FROM THE HUMAN JEJUNUM IN VIVO. (Eng.) Cook, G. C. (Hosp. Tropical Diseases, 4 St. Pancras Way, London, NW1 OPE, England). *Am. J. Clin. Nutr.* 30(2):1994-1998; 1977.

Jejunal absorption rates of L-histidine (from a 100 mM solution) and glycylglycine (from a 50 mM solution) were determined with a double-lumen tube perfusion system *in vivo* in six men with acute bacterial pneumonia (infection group) and six controls with no clinical evidence of a bacterial infection. The mean rate of histidine absorption was significantly higher in the infection group (0.795 ± 0.044 mmol/30 cm jejunum/min) compared with the control group (0.637 mmol/30 cm/min, $p<0.05$), but mean rates for glycine absorption from glycylglycine were not significantly different. During the glycylglycine infusions, the luminal disappearance rate of the intact peptide was significantly greater than the total glycine absorption rate ($p<0.001$). The correlation between individual histidine and glycylglycine absorption rates was significant ($r=+0.645$, $p<0.05$). This correlation probably occurs because, after intracellular hydrolysis and efflux to the lumen, some glycylglycine is reabsorbed as free glycine by the amino acid transfer mechanism, and the rate of that reabsorption has previously been shown to be increased in subjects with systemic bacterial infections.

2666 EFFECTS OF SORBITOL ON THE ACTION OF ALKALINE PHOSPHATASES ISOLATED FROM VARIOUS REGIONS OF THE RAT SMALL INTESTINE. (Fre.) Dupuis, Y.; Digaud, A.; Fontaine, N. (C.N.R.S. No. 1098, Physiologie, Faculte de Pharmacie, 92290 Chatenay-Malabry, France). *C. R. Soc. Biol. (Paris)* 171(2):294-302; 1977.

2667 IRON ABSORPTION AFTER ORAL APPLICATION OF A COMBINATION OF Fe^{2+}-SUCCINATE AND MULTIVITAMINS. (Ger.) Zillessen, E.; Frerichs, F.; Herzfeld, U.; Bader, R.; Hunstein, W. (Talstrasse 24, 6900 Leimen, W. Germany). *Arzneim. Forsch.* 27(II, 8):1606-1608; 1977.

2668 TESTING OF INTESTINAL ABSORPTION IN CHRONIC ALCOHOLICS WITH D-XYLOSE. (Rum.) Radulescu, D. (Spitalul Orasenesc Dragasani, Rumania). *Rev. Ig.* 26(2):145-148; 1977.

2669 ORAL IRON TREATMENT: INTESTINAL ABSORPTION AND THE INFLUENCE OF A MEAL. (Ger.) Werner, E.; Kaltwasser, J. P.; Ihm, P. (Institut fur Biologie, Paul-Ehrlich-Str. 20, 6000 Frankfurt 70, W. Germany). *Dtsch. Med. Wochenschr.* 102(29): 1061-1064; 1977.

2670 INFLUENCE OF HEPARIN ON ACTIVE GLUCOSE TRANSPORT IN THE SMALL INTESTINE IN PERITONITIS. (Rus.) Popov, V. A. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Patol. Fiziol. Eksp. Ter.* (3):75-76; 1977.

2671 PECULIARITIES OF THE SPACE-TIME ORGANIZATION OF THE SYSTEMS OF MEMBRANOUS HYDROLYSIS AND TRANSPORT INTO THE RAT SMALL INTESTINE. (Rus.) Loginov, G. I. (M. I. Kalinin Andizhan State Medical Inst., Andizhan, USSR). *Biull. Eksp. Biol. Med.* 83(5):556-558; 1977.

2672 ELECTRICAL POTENTIAL DIFFERENCE BETWEEN ILEAL MUCOSA AND SKIN IN THE CHILD: EFFECT OF REDUCING SODIUM INTAKE. (Fre.) Ricour, C.; Feydy, P.; Arhan, P. (Hopital des Enfants Malades, 149, rue de Sevres, 75730 Paris Cedex 15, France). *Ann. Biol. Anim. Biochim. Biophys.* 17(4):531-534; 1977.

See also, 2724, 2890, 2999, 3156, 3419.

MOTILITY

2673 VAGAL CONTROL OF LOWER ESOPHAGEAL SPHINCTER MOTILITY IN THE CAT. (Eng.) Gonella, J.; Niel, J. P.; Roman, C. (Institut de Neurophysiologie et Psychophysiologie, 31 Chemin Joseph Aiguier, 13274 Marseille Cedex 2, France). *J. Physiol. (Lond.)* 273(1):647-664; 1977.

The effects of vagal efferent fiber stimulation on the smooth muscle of the lower esophageal sphincter were studied in anesthetized cats and in isolated and perfused organ. In both the longitudinal and circular muscle layers, vagal stimulation elicited two types of electromyographic (EMG) potentials: (a) excitatory junction potentials (EJPS) where there was a depolarization of the smooth muscle fibers and (b) inhibitory junction potentials (IJPS) where there was hyperpolarization of the smooth muscle fibers, often followed by a transient depolarization that could initiate spikes (postinhibitory rebound). EJPS gave rise to spike potentials inducing a contraction of the sphincter. Pure IJPS were observed after atropine treatment, which suppressed EJPS. Under these conditions, a long lasting vagal stimulation induced a long duration hyperpolarization concomitant with an opening of the lower esophageal sphincter followed after the cessation of stimulation by a powerful rebound leading to a strong contraction, which closed the sphincter. The results suggest the following conclusions. Preganglionic vagal fibers are cholinergic, and they activate intramural excitatory cholinergic neurons and intramural nonadrenergic inhibitory neurons (purinergic neurons). Preganglionic fibers leading to inhibition have a higher threshold than those leading to excitation. Both excitatory and inhibitory pathways are interconnected inside the intramural network. In particular, activation of intramural inhibitory neurons, by relaxing the esophagus orally to the lower esophageal sphincter, inhibits intramural excitatory neurons and subsequently blocks vagal excitatory responses. Two functions may be attributed to the vagal extrinsic innervation: (a) closure of the lower esophageal sphincter by maintaining the basal tone of the sphincter; this would imply that at rest the inhibitory control is supplanted by the excitatory one and (b) opening the sphincter during swallowing by suppressing the excitatory stimulus and reinforcing the inhibitory one.

2674 AN EXTRALUMINAL FORCE TRANSDUCER FOR RECORDING CONTRACTILE ACTIVITY OF THE GASTROINTESTINAL SMOOTH MUSCLE IN THE CONSCIOUS DOGS: ITS CONSTRUCTION AND IMPLANTATION. (Eng.) Itoh, Z.; Honda, R.; Takeuchi, S.; Aizawa, I.; Takayanagi, R. (Gunma Univ. Sch. Medicine, Maebashi, 371, Japan). *Gastroenterol. Jpn.* 12(4):275-283; 1977.

An extraluminal strain-gauge force transducer for the continuous long-term (more than 5 months) recording of contractile activity of the gastrointestinal smooth muscle in conscious experimental animals was constructed and tested in dogs. Since the transducer is sutured onto the outside of the gut, it does not interfere with the passage of contents in the gut. The transducer was demonstrated by using it to record 24-hr changes in motor activity in the gastric body and antrum of a conscious dog using a paper recording speed of 1 mm/min. The contractile activity pattern of the stomach consisted of two major components, digestive and interdigestive states. The digestive pattern was characterized by continuous steady contractions in the antrum and no movements in the gastric body. The interdigestive pattern consisted of a period of strong contractions of short duration and long-lasting motor quiescence in the gastric body and antrum. When the contractile activity pattern of the stomach was examined using a slower recording speed, it was found that another motor pattern was present; this pattern was intermediate between the two major components of the stomach contractile activity pattern. The findings obtained with the extraluminal transducer were almost identical to changes of intraluminal pressure recorded with the use of a small balloon placed in the gastric antrum. A disadvantage of the extraluminal transducer is that it measures only muscle contractions, making it difficult to determine movements of intraluminal contents, especially in the digestive state.

2675 INTERACTION BETWEEN LONGITUDINAL AND CIRCULAR MUSCLE IN INTESTINE OF CAT. (Eng.) Connor, J. A.; Kreulen, D.; Prosser, C. L.; Weigel, R. (Dept. Physiology, Univ. Illinois, Urbana, IL 61801). *J. Physiol. (Lond.)* 273(3):665-689; 1977.

The electrical activity of the circular and longitudinal muscle layers was studied in small intestinal segments of cats, and differences in the activities of these layers *in vivo* and *in vitro* were noted. Slow waves recorded from isolated longitudinal muscle averaged 13 mV and had slow rate of rise (0.04 V/sec), whereas recordings from intact segments showed the amplitude averaged 27 mV, and the rate of rise was more rapid (0.09 V/sec), often with a notch between the initial peak and the plateau. Membrane potentials of longitudinal muscle were similar in isolated and intact preparations (-66 mV). Resting potentials of circular muscle averaged -67 mV. Small bundles of circular muscle tested in the double sucrose gap produced activity in three categories, either spontaneously or in response to stimulation: fast spikes (50-200 msec duration), slow spikes (1-5 sec duration), and small graded responses. The duration of fast spikes was increased several-fold by the addition of 20 mM tetraethylammonium (TEA); the graded responses were converted to full-sized spikes by TEA. Treatment of circular muscle with calcium-free Krebs solution eliminated spikes, and, in intact preparations, reduced the amplitude and rate of rise of slow waves and eliminated the notch on slow waves. Current-voltage curves of longitudinal muscle showed delayed rectification in the depolarizing quadrant; similar curves of circular muscle showed anomalous rectification, i.e., a region where a very small current caused a large voltage change. Nonpolarized electrotonic coupling between longitudinal and circular layers indicates low-resistance pathways. Apparent space constants of longitudinal muscle were greater when attached to circular muscle than when isolated. It is concluded that small slow potentials originate rhythmically in longitudinal muscle, that these spread passively to circular muscle where a regenerative amplification occurs that depends on calcium conductance, and that the amplified slow waves spread back to the longitudinal layer. In the intact intestine, pacemaking is, therefore, separate from propagation, and the circular muscle provides the bulk of depolarizing current for propagation.

2676 EFFECT OF SUBSTANCE P ON INTESTINAL MUSCLE. (Eng.) Yau, W. M. (Sch. Medicine, Southern Illinois Univ., Carbondale, IL 62901). *Gastroenterology* 74(2, Part 1):228-231; 1978.

The mode of action of synthetic substance P on small intestinal motility was investigated *in vitro* in female guinea pigs. Substance P had a major stimulating effect on the intestine by eliciting mechanical contraction and bursts of spike potentials. On a molar basis, substance P was 1.6 x 10^3 times more potent than acetylcholine. Unlike cerulein, the effects of which were mediated through the release of acetylcholine from the enteric plexuses, the site of action of substance P appeared to be directly on the muscle cells because its effects were resistant to atropine, tetrodotoxin, and Lioresal. These data strongly suggest a possible physiological role of substance P in the modulation of intestinal longitudinal muscle motor activity.

2677 EFFECTS OF SOME GASTROINTESTINAL HORMONES ON TWO MUSCLE LAYERS OF DUODENUM. (Eng.) Anuras, S.; Cooke, A. R. (Veterans Admin. Hosp., Iowa City, IA 52242). *Am. J. Physiol.* 234(1): E60-E63; 1978.

The effects of gastrointestinal hormones on the longitudinal and circular muscle of opossum and cat duodenum were studied, to determine whether the two muscle layers respond differently to various stimuli. The duodena were cut into strips 2 mm wide and 2-2.5 cm long. Strips cut in the oral-caudal axis were called longitudinal strips; those cut at 90 degrees to that axis were called circular strips. Cholecystokinin (CCK, maximum amplitude of contraction achieved at 5 x 10^{-9} M) and cerulein (2 x 10^{-7} M) stimulated phasic contractions of circular muscle of opossum duodenum, but had no effect on the longitudinal muscle. The effect of CCK was not blocked by tetrodotoxin (10^{-7} M), indicating a direct muscle stimulation. CCK (10^{-8}, 10^{-7}, and 2.5 x 10^{-7} M) had no effect on either muscle layer of the cat duodenum. In opossum duodenum, vasoactive intestinal peptide (10^{-7} M) raised tension in longitudinal muscle by 1 g but reduced tension in circular muscle by 0.8 g. Glucagon (10^{-5} M) slightly reduced tension in both longitudinal and circular muscle of opossum duodenum. It also inhibited contractions of circular muscle caused by acetylcholine. Pentagastrin (10^{-7}, 10^{-6}, and 10^{-5} M) and secretin (10^{-8}, 10^{-7}, 10^{-6}, and 4 x 10^{-5} M) had no effect on either muscle layer in either species. These findings suggest that the circular and longitudinal muscle layers of the duodenum respond differently to at least some gastrointestinal hormones. Also, there is species variation in response to gastrointestinal hormones.

2678 INFLUENCE OF PYRIDYLISATOGEN TOSYLATE ON CONTRACTIONS PRODUCED BY ATP AND BY PURINERGIC STIMULATION IN THE TERMINAL ILEUM OF THE GUINEA-PIG. (Eng.) Kazic, T.; Milsavljevic, D. (Dept. Pharmacology, Medical Faculty, 11000 Beograd, P.O. B 662, Yugoslavia). *J. Pharm. Pharmacol.* 29(9): 542-545; 1977.

The effect of 2-2'pyridylisatogen tosylate (PIT) on contractions produced by ATP and by purinergic stimulation was investigated in terminal segments of ileum isolated from guinea pigs. PIT did not antagonize the excitatory effects of exogenous ATP and of purinergic stimulation of the terminal guinea pig ileum. PIT (0.5-2.5 μM) potentiated the ATP-induced contractions and also the contractions produced by potassium chloride, although the potentiation could not be related to the dose in every experiment. The responses to norepinephrine, epinephrine, and histamine were slightly inhibited. PIT also potentiated the contractions produced by elec-

trical stimulation of intramural purinergic nerves when either an alternate or uniform stimulation pattern was used. These results, in which the preparation is contracted by ATP, are opposite to those obtained with PIT on the taenia caeci, which is relaxed by ATP. This finding raises a question of duality or plurality of receptors for ATP.

2679 CONTROL OF GASTRIC EMPTYING: INTERACTION OF THE VAGUS AND PYLORIC ANTRUM. (Eng.) Yamagishi, T.; Debas, H. T. (Dept. Surgery, Univ. British Columbia, 700 West 10th Ave., Vancouver, British Columbia V5Z 1L5, Canada). *Ann. Surg.* 187(1):91-94; 1978.

To investigate the interaction of the vagus and the pylorus in the control of gastric emptying, the gastric emptying of liquids and solids was evaluated in 10 dogs with gastric fistula before and after either truncal vagotomy, antrectomy, or pyloroplasty. In subsequent operations, the vagotomy group underwent either antrectomy or pyloroplasty, and the antrectomy and pyloroplasty groups were vagotomized. Vagotomy significantly inhibited the emptying of both liquids and solids ($p<0.001$) when the pyloric antrum was intact. When the antropyloric mechanism was removed by antrectomy, the effect of vagotomy was to accelerate the emptying of liquids ($p<0.05$) but to impair the emptying of solids ($p<0.001$). After pyloroplasty, vagotomy markedly accelerated the emptying of liquids but had little effect on the emptying of solids. Neither antrectomy nor pyloroplasty had any significant effect on the emptying of solids. Pyloroplasty caused minor acceleration of emptying of liquids while antrectomy had no effect. These data show that, after vagotomy, the pylorus acts as a major obstruction to gastric emptying of both liquids and solids.

2680 VAGALLY INDUCED GASTRIC ANTRAL CONTRACTIONS AND GASTRIC EMPTYING OF A LIQUID TEST MEAL. (Eng.) Carr, D. H.; Brooks, F. P. (Dept. Physiology and Anatomy, Massey Univ., Palmerston North, New Zealand). *Q. J. Exp. Physiol.* 63(1): 49-58; 1978.

The emptying of a liquid test meal from the stomach was studied during, and in the absence of, electrical stimulation of cut ends of a thoracic branch of the vagus in anesthetized cats. The test meal (154 mM NaCl and 30 mg/l phenol red) was measured by collecting effluent from a duodenal fistula over a 30-min period. The stomach emptied about 60% of the meal under control conditions compared with over 90% during efferent stimulation of the vagus. The increased volumes emptied during efferent stimulation were not accounted for by gastric acid secretion. Coincident with the vagally evoked antral contractions, there was a gush of liquid from the duodenal cannula. Afferent vagal stimulation resulted in an initial marked delay of emptying followed by an acceleration so that the volume emptied after 30 min was similar to that in control experiments. These experiments show that antral contractions, evoked by efferent vagal stimulation, accelerate gastric emptying of a liquid test meal.

2681 THE INFLUENCE OF GRADED DISTENSION AND CARBACHOL ON THE MOTOR RESPONSE TO CHOLECYSTOKININ IN ISOLATED GUINEA-PIG ANTRUM AND FUNDUS. (Eng.) Gerner, T.; Haffner, J. F. W. (Ullevål Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 12(6):745-749; 1977.

The effect of graded distention on the motor response to cholecystokinin (0.38 U/ml) and acetylcholine (10^{-3} M) in guinea pig antral and fundal pouches was investigated. Using a balloon technique, the pouches were increased in diameter by one-tenth of the initial diameter in each of four steps. At the concentrations used, both cholecystokinin and acetylcholine invariably stimulated motor activity. The increase mainly consisted of increased amplitude of rhythmic activity in the antrum and of increased basal pressure in the fundus. The responses to acetylcholine were consistently more pronounced than those to cholecystokinin. Distention had the most marked effect on basal pressure, but it also increased spontaneous pressure amplitude and enhanced the peak responses to cholecystokinin and acetylcholine. When the alterations in pressure were converted into wall tension the increase became even more marked. Changes in both spontaneous activity and drug responses were statistically significant ($p<0.05$) compared with undistended controls, and both spontaneous activity and drug responses reached a maximum when the pouch diameter was increased by 1.2-1.3 times its original diameter. Carbachol at concentrations of 10^{-8} to 10^{-4} M also increased rhythmic activity in the antrum and basal pressure in the fundus in a manner similar to that of cholecystokinin and acetylcholine. Prestimulation with carbachol 10 min before each addition of cholecystokinin resulted in an additive effect at the lowest carbachol concentrations (10^{-8} and 10^{-7} M); however, the response to cholecystokinin markedly declined after prestimulation with higher carbachol concentrations. The results indicate that the increased response to cholecystokinin after distention is due to increased smooth muscle stretch.

2682 EFFECT OF PENTAGASTRIN INFUSION ON GASTRIC EMPTYING RATE OF SOLID FOOD IN MAN. (Eng.) MacGregor, I. L.; Wiley, Z. D.; Martin, P. M. (Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121). *Am. J. Dig. Dis.* 23(1):72-75; 1978.

The effect of i.v. pentagastrin (4 µg/kg/hr) on the rate of gastric emptying of solid food was studied in six normal men. A meal consisting of one ^{99m}Tc-tagged chicken liver mixed with beef stew and taken with 200 ml of water was followed on its passage through the gastrointestinal tract by intermittent scanning with a gamma camera. The rate of the linear gastric emptying pattern was slowed by pentagastrin in every subject. The pH and titratable acidity of the gastric contents were similar in the pentagastrin and the control infusions. Neutralization of the gastric contents with bicar-

bonate in the pentagastrin studies did not alter gastric emptying rates. The results indicate that pentagastrin slows gastric emptying of solid food in man by an effect other than acid secretion.

2683 RELAXATIONS OF GUINEA-PIG FUNDIC STRIP BY ADENOSINE, ADENINE NUCLEOTIDES AND ELECTRICAL STIMULATION: ANTAGONISM BY THEOPHYLLINE AND DESENSITIZATION TO ADENOSINE AND ITS DERIVATIVES. (Eng.) Okwuasaba, F. K.; Hamilton, J. T.; Cook, M. A. (Dept. Pharmacology, Univ. Western Ontario, London, Ontario N6A 5C1, Canada). *Eur. J. Pharmacol.* 46(3):181-198; 1977.

The effect of theophylline on relaxations of guinea pig fundic strips elicited by stimulation of noncholinergic, nonadrenergic nerves was compared to the effects of exogenously added drugs. In addition, the ability to desensitize the tissue in the presence of adenosine and related nucleotides was investigated to assess the role of the drugs as possible intramural transmitters. Adenosine and related compounds produced a concentration-dependent relaxation of the fundic strips in nontreated preparations and in preparations treated with atropine, tetrodotoxin (TTX), guanethidine, reserpine, or 6-hydroxydopamine (6-OH-DA). The relative potencies in descending order were ATP≥ADP>adenosine. Theophylline (THEO) at low concentrations (25-75 μM) selectively antagonized the inhibitions produced by ATP, ADP, and adenosine without antagonizing those due to norepinephrine (NE), isoproterenol (ISO), and papaverine (PAPAV). Schild plots yielded apparent pA_2 values for THEO of 1.4×10^{-5} M, 1.8×10^{-5} M, and 2.8×10^{-5} M for ATP, ADP, and adenosine, resp., with slopes that were not significantly different ($p>0.05$). These results suggest competitive antagonism. Theophylline was a more specific antagonist of the relaxations induced by the purines than were compounds such as quinidine, phentolamine, or 2,2'-pyridylisatogen (PIT). In fundic strips pretreated with atropine (1×10^{-7}-5×10^{-7} M), transmural or periarterial nerve stimulation produced relaxations that were frequency-dependent. The effects of periarterial nerve stimulation were abolished by phentolamine plus propranolol, by guanethidine, by bretylium, by TTX, and by pretreatment with reserpine or 6-OH-DA. The responses to transmural nerve stimulation were abolished only by TTX. The relaxations induced by transmural nerve stimulation were reduced or abolished by THEO, whereas those produced by periarterial nerve stimulation were not affected. Theophylline was more selective than quinidine or phentolamine in blocking such responses. Exposure of the tissues to high concentrations of ATP, ADP, or adenosine caused tachyphylaxis to the relaxations induced by the purines as well as those to transmural nerve stimulation, while the responses to NA, ISO, PAPAV, or periarterial nerve stimulation were either augmented or unaffected. The effects of desensitization were reversible. This finding suggests that the response to transmural nerve stimulation may be due to neural release of adenosine or a related compound. An adenine nucleotide or nucleoside released from nerves might have a physiological function in the "receptive relaxation" of the stomach following stimulation of the pharynx and upper esophagus by passage of a bolus of food.

2684 EFFECT OF VASOACTIVE INTESTINAL POLYPEPTIDE ON GALLBLADDER SMOOTH MUSCLE IN VITRO. (Eng.) Ryan, J. P.; Ryave, S. (Temple Univ. Sch. Medicine, Philadelphia, PA 19140). *Am. J. Physiol.* 234(1):E44-E46; 1978.

The effect of vasoactive intestinal polypeptide (VIP) on basal tension and on tension induced by octapeptide of cholecystokinin (OP-CCK) was examined with guinea pig gallbladder smooth muscle strips *in vitro*. VIP (1.0-200.0 ng/ml) alone produced dose-related decreases in resting tension, and antagonized spontaneous contractile activity where present. In combination with OP-CCK (0.1-10.0 ng/ml), VIP decreased the expected contractile response. The degree of antagonism depended upon the concentrations of OP-CCK and VIP. VIP had no effect on acetylcholine-induced contractions. It is proposed that VIP can affect gallbladder motor activity by decreasing smooth muscle tone and by antagonizing cholecystokinin. These findings support the proposal that gallbladder motor function may depend upon the action and interaction of the gastrointestinal hormones.

2685 INFLUENCE OF THE REMOVAL OF EXTERNAL K ON TONUS AND DRUG-INDUCED CONTRACTIONS OF THE ISOLATED RAT ILEUM, PARTICULARLY IN RELATION TO Ca. (Eng.) Takahashi, N. (Kobe Univ. Sch. Medicine, Japan). *Kobe J. Med. Sci.* 22(4):273-282; 1976.

2686 IRREVERSIBLE INHIBITION BY ATROPINE OF DRUG-INDUCED CONTRACTIONS IN ISOLATED RABBIT ILEUM, PARTICULARLY IN RELATION TO THE MOBILIZATION OF Ca. (Eng.) Araki, H.; Cheng, J. T.; Ogino, K.; Taniyama, K. (Kobe Univ. Sch. Medicine, Japan). *Kobe J. Med. Sci.* 22(4):247-253; 1976.

2687 IRREVERSIBLE INHIBITORY EFFECT OF ATROPINE ON THE CONTRACTILE RESPONSES TO DRUGS IN ISOLATED RAT RECTUM, PARTICULARLY IN RELATION TO Ca. (Eng.) Ogino, K.; Cheng, J. T.; Araki, H. (Kobe Univ. Sch. Medicine, Japan). *Kobe J. Med. Sci.* 22(4):239-246; 1976.

2688 EFFECT OF INTRACEREBROVENTRICULAR ADMINISTRATION OF MORPHINE UPON INTESTINAL MOTILITY IN RAT AND ITS ANTAGONISM WITH NALOXONE. (Eng.) Parolaro, D.; Sala, M.; Gori, E. (Inst. Pharmacology, Univ. Milan, Via Vanvitelli 32/A, 20129 Milan, Italy). *Eur. J. Pharmacol.* 46(4): 329-338; 1977.

2689 TWO METHODS TO ASSESS THE GASTRO-INTESTINAL TRANSIT-TIME IN MICE. (Eng.) Koopman, J. P.; Kennis, H. M. (Central Animal Lab., Catholic

Univ. Nijmegen, Geert Grooteplein Noord 29, Nijmegen, Netherlands). *Z. Versuchstierk.* 19(6):298-303; 1977.

2690 ACTION OF HISTAMINE AND RELATED COMPOUNDS ON THE PYLORIC SPHINCTER OF THE RAT. (Eng.) Bertaccini, G.; Coruzzi, G.; Molina, E.; Chivarini, M. (Ospedale Maggiore, Via Gramsci 14, 43100 Parma, Italy). *Rend. Gastroenterol.* 9(3): 163-168; 1977.

2691 CONTRIBTION TO THE STUDY OF THE FUNCTIONING OF ODDI'S SPHINCTER. (Eng.) Caroli, J. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 48-51; 1977.

2692 NORMAL PHYSIOLOGY OF ODDI'S SPHINCTER; NERVOUS REGULATION; PHARMACOLOGICAL STUDIES. (Eng.) Stalport, J. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 52-57; 1977.

2693 EXPERIMENTAL STUDY OF ODDI PHYSIOLOGY BY PNEUMOFLOWMETER. (Eng.) Arsac, M.; Kieffer, J. L.; Salamao, J. P.; Piettre, G. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 58-60; 1977.

2694 POSTOPERATIVE BILIARY MANOMETRY: EFFECTS OF MORPHINE AND ANTISPASMODICS UNDER VARIOUS FLOW RATES OF INTRACHOLEDOCHAL INFUSION. (Eng.) Galmiche, J. P.; Gislon, J.; Bonfils, S. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 61-65; 1977.

2695 DUODENOSCOPIC MANOMETRY OF THE COMMON BILE DUCT. (Eng.) Hagenmuller, F.; Ossenberg, F. W.; Classen, M. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 72-76; 1977.

2696 PAPILLA ELECTROMYOGRAPHY: ENDOLUMINAL RECORDING PERFORMED IN MAN BY PERDUODENOSCOPIC CANNULATION. (Eng.) Salducci, J.; Naudy, B.; Pin, G.; Ranieri, F.; Monges, H. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 77-79; 1977.

2697 MANOMETRIC AND ELECTROMYOGRAPHIC DATA CONCERNING HUMAN DUODENUM: DO DUODENAL SPHINCTERS EXIST? (Eng.) Salducci, J.; Naudy, B. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 129-130; 1977.

2698 MOTOR RESPONSES TO GASTRIN AND CHOLECYSTOKININ IN GUINEA-PIG ISOLATED ANTRUM AND FUNDUS [Abstract]. (Eng.) Gerner, T.; Haffner, J. F. W. (Ullevaal Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):21; 1977.

2699 SIMULTANEOUS RECORDING OF GASTRIC AND DUODENAL ELECTRICAL ACTIVITY [Abstract]. (Eng.) Civalero, L. A.; Kantelius, M.; Nilsson, B. Y. (Dept. Surgery, Sodersjukhuset, Stockholm, Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 45):17; 1977.

2700 CALCULATED MAXIMAL AMPLITUDE VERSUS MILLAR MICRO-TIP IN RECORDING OF ESOPHAGEAL PERISTALSIS [Abstract]. (Eng.) Boesby, S.; Madsen, T.; Pedersen, S. A. (Odense Univ. Hosp., Odense, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):13; 1977.

2701 GASTRIC ADAPTIVE RELAXATION. EFFECTS OF VAGAL ACTIVATION AND VAGOTOMY: AN EXPERIMENTAL STUDY IN DOGS AND IN MAN. (Eng.) Jahnberg, T. (Sahlgren's Hosp., Goteborg, Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 46):1-32; 1977.

2702 CONTINUOUS QUANTITATION OF GALLBLADDER EMPTYING IN RESPONSE TO INCREASING DOSES OF CHOLECYSTOKININ (CCK) [Abstract]. (Eng.) Spellman, S. J.; Shaffer, E. A.; Rosenthall, L. (Montreal General Hosp., Montreal, Quebec, Canada). *Clin. Res.* 25(5):689A; 1977.

2703 EFFECTS OF PENTAGASTRIN ON THE CIRCULAR MUSCLE OF THE CORPUS AND FUNDUS AND ON THE GASTRIC SLING MUSCLE OF THE DOG [Abstract]. (Eng.) Hughes, J.; Kreulen, D. L.; Szurszewski, J. H. (Mayo Medical Sch., Rochester, MN 55901). *Physiologist* 20(4):45; 1977.

2704 NEW KNOWLEDGE ON PHYSIOLOGY AND PATHOPHYSIOLOGY OF HUMAN INTESTINAL MOTILITY [Abstract]. (Eng./Ger.) Kern, E.; Schmidt, E.; Laven, R.; Bruch, H. P. (Chirurgische Univ.-Klinik, Josef Schneider-Str. 2, D-8700 Wurzburg, W. Germany). *Langenbecks Arch. Chir.* 345:611; 1977.

2705 MILLAR MICRO-TIP PRESSURE TRANSDUCERS USED IN OESOPHAGEAL MANOMETRY ON NORMAL SUBJECTS [Abstract]. (Eng.) Wallin, L.; Boesby, S.; Madsen, T. (Odense Univ. Hosp., DK-5000 Odense, Denmark). *Scand. J. Gastroenterol.* 12 (Suppl. 45):112; 1977.

2706 VAGAL MEDIATION OF GASTRIC MOTILITY AND EMPTYING IN ANESTHETIZED CATS [Abstract]. (Eng.) Bauer, R. F.; Silverman, L.; Brooks, F. P. (Dept. Physiology, Univ. Pennsylvania, Philadelphia, PA 19104). *Physiologist* 20(4):6; 1977.

2707 CALCIUM AND THE CONTRACTILE RESPONSE TO PROSTAGLANDIN IN THE SMOOTH MUSCLE OF GUINEA-PIG STOMACH. (Eng.) Ishizawa, M.; Miyazaki, E. (Sapporo Medical Coll., W.17, S. 1, Sapporo, Japan). *Experientia* 33(3):376-377; 1977.

2708 GASTRIC RELAXATORY RESPONSE TO FEEDING BEFORE AND AFTER VAGOTOMY. (Eng.) Jahnberg, T.; Abrahamsson, H.; Jansson, G.; Martinson, J. (Sahlgren's Hosp., 41345 Goteborg, Sweden). *Scand. J. Gastroenterol.* 12(2):225-228; 1977.

2709 EFFECT OF VAGOTOMY ON GASTRIC MOTILITY. (Eng.) Stadaas, J. O. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 11(Suppl. 42):85-88; 1976.

2710 AN APPARATUS FOR CHEMICAL AND ELECTRICAL STIMULATION OF THE ISOLATED RAT ILEUM. (Eng.) Von Wietersheim, A.; Hock, F. J. (Gesamthochschule Kassel, Heinrich-Plett-Strasse 40, D-3500 Kassel, W. Germany). *Pfluegers Arch.* 369(3):289-290; 1977.

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See also, 2632, 2643, 2719, 2747, 2756, 2908, 2914, 2993, 3005, 3021, 3023, 3027, 3035, 3061, 3091, 3094, 3198.

SECRETION AND METABOLISM

2712 HEPTADECAPEPTIDE GASTRIN IN THE VAGAL NERVE. (Eng.) Uvnas-Wallensten, K.; Rehfeld, J. F.; Larsson, L. I.; Uvnas, B. (Karolinska Institutet, Stockholm, Sweden). *Proc. Natl. Acad. Sci. USA* 74(12):5707-5710; 1977.

Studies were carried out to determine whether heptadecapeptide gastrin is present in specimens from the main trunks of the cervical, thoracic, and abdominal vagi of dogs and cats and in specimens from the abdominal vagus of humans. Immunoreactive gastrin was present in vagal nerves from cats, dogs, and humans. The abdominal portion of the vagus contained gastrin in amounts ranging from 16 to 273 pmol/g of nerve tissue (wet weight). The thoracic and cervical portion of the vagi contained only minute amounts of gastrin. Gel chromatography of extracts of human, canine, and feline abdominal vagi monitored by region-specific antisera against heptadecapeptide gastrin and triacontatriapeptide cholecystokinin revealed that the vagal gastrin immunoreactivity predominantly consisted of heptadecapeptide gastrin. In addition, the vagi contained small amounts of the NH_2-terminal tridecapeptide gastrin fragment as well as of the putative biosynthetic gastrin precursors, components I and II. No cholecystokinin-like molecules were demonstrable. Immunocytochemical studies demonstrated gastrin-containing nerves in the intestinal wall. The nerves were most numerous in the large and distal small intestine. These findings suggest that heptadecapeptide gastrin may represent a new vagal neurotransmitter.

2713 XYLITOL ASSOCIATED CHANGES IN AMYLASE AND PROTEIN CONTENT OF MONKEY PAROTID SALIVA. (Eng.) Bird, J. L.; Baum, B. J.; Makinen, K. K.; Bowen, W. H.; Longton, R. W. (Naval Medical Res. Inst., Bethesda, MD 20014). *J. Nutr.* 107(10): 1763-1767; 1977.

2714 EFFECTS OF SEX HORMONES ON SYNTHESIS OF PROTEINS CONTAINED IN GRANULES PRESENT IN CONVOLUTED TUBULAR CELLS OF MOUSE SUBMANDIBULAR GLANDS. (Eng.) Hosoi, K.; Ueha, T. (Josai Dental Univ., Sakado, Saitama 350-02, Japan). *J. Biochem. (Tokyo)* 82(2):351-358; 1977.

2715 UROGASTRONE LEVELS IN THE URINE OF NORMAL ADULT HUMANS. (Eng.) Gregory, H.; Holmes, J. E.; Willshire, I. R. (Imperial Chemical Industries Ltd., Alderly Park, Macclesfield, Cheshire, England). *J. Clin. Endocrinol. Metab.* 45(4):668-672; 1977.

2716 CATALASE IN SALIVARY GLAND STRIATED AND EXCRETORY DUCT CELLS. I. THE DISTRIBUTION OF CYTOPLASMIC AND PARTICULATE CATALASE AND THE PRESENCE OF CATALASE-POSITIVE RODS. (Eng.) Hanker, J. S.; Preece, J. W.; Burkes, E. J., Jr.; Romanovicz, D. K. (Univ. North Carolina at Chapel Hill, Chapel Hill, NC 27514). *Histochem. J.* 9(6):711-728; 1977.

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2718 THE DECOMPOSITION OF MONOFLUOROPHOSPHATE BY ENZYMES IN WHOLE HUMAN SALIVA. (Eng.) Pearce, E. I. F.; Jenkins, G. N. (Medical Res.

Council New Zealand, P.O. Box 27007, Wellington, New Zealand). *Arch. Oral Biol.* 22(6):405-407; 1977.

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See also, 2629, 2727, 2914, 2921, 3351.

SECRETION AND METABOLISM

Stomach

2720 CONCENTRATIONS OF GASTRIN AND SECRETIN IN THE ALIMENTARY TRACT OF THE CAT. (Eng.) Miller, T. A.; Llanos, O. L.; Swierczek, J. S.; Rayford, P. L.; Thompson, J. C. (Univ. Texas Medical Branch, Galveston, TX 77550). *Surgery* 83(1):90-93; 1978.

The distribution of gastrin and secretin was determined from the esophagogastric junction to the ileocecum in the cat. The total content and concentration of each of these hormones in mucosal extracts taken from the gastric fundus, gastric antrum, proximal and distal duodenum, proximal and distal jejunum, and ileum were measured with specific radioimmunoassays. The gastric antrum contained the highest concentration of gastrin (31,686.2 ± 8,375.7 ng), but appreciable amounts also were found in the duodenum (642.7 ± 184.6 and 1,074.0 ± 127.7 ng in proximal and distal regions, resp.). The highest concentrations of secretin were found in the duodenum (293.3 ± 43.4 and 1,323.7 ± 188.6 ng in proximal and distal regions, resp.), but impressive quantities were measured in the jejunum (710.2 ± 256.9 and 435.2 ± 90.8 ng in proximal and distal regions, resp.). The role of extra-antral gastrin and of those stores of secretin beyond the proximal duodenum (where the pH probably never falls to levels associated with release of secretin) currently are unknown.

2721 SECRETORY STATE OF GASTRIC MUCOSA AND ITS RESISTANCE TO ASPIRIN INJURY. (Eng.) Porterfield, G. N.; Cheung, L. Y. (Washington Univ. Sch. Medicine, 4960 Audubon Ave., St. Louis, MO 63110). *Am. J. Surg.* 135(1):115-119; 1978.

The influence of the secretory status on gastric mucosal tolerance to aspirin injury was assessed in a canine *ex vivo* model, which provided two segments of mucosa supplied by a single vascular pedicle in the same dog. Acid secretion was stimulated by the i.v. infusion of histamine (1 µg/kg/min) in one mucosa, whereas the secretory response to histamine was significantly impaired by topical treatment with 16,16-dimethylprostaglandin E_2 (25 µg) in the other. The secreting mucosa exhibited a twofold greater blood flow than the inhibited mucosa. Exposure of both mucosae to 20 mM aspirin for 30 min resulted in the appearance of small multiple superficial erosions. The degree of mucosal injury was not significantly different between the secreting and inhibited mucosae. The extent of mucosal damage was similar to that seen when aspirin in acid was placed on resting mucosa in the same model. These data do not support the hypothesis that histamine-stimulated acid secretion and accompanying increase in gastric mucosal blood flow protects against aspirin injury.

2722 EFFECT OF Ca^{2+}, Mg^{2+}, NaN_3, CHOLINERGIC AGENTS, AND GASTROINTESTINAL HORMONES ON THE GUANYLATE CYCLASE FROM GUINEA PIG GASTRIC MUCOSA. (Eng.) Griessen, M. (Hopital Cantonal, 1211 Geneve 4, Switzerland). *Gastroenterology* 74(2, Part 1):263-270; 1978.

The kinetic properties of gastric mucosal guanylate cyclase were examined in the guinea pig gastric mucosa, and the possibility that choline esters and pentagastrin increase the cyclic GMP production in the guinea pig gastric mucosa was tested. Guanylate cyclase in the fundic mucosa occurred in two enzymatic forms: a "soluble" form and a particulate form. The mean basal activity of the soluble fraction measured in the presence of 300 µM guanosine-5'-triphosphate and 5 mM $MnCl_2$ was 72.6 ± 5.3 pmol cyclic GMP/mg protein/min. Guanylate cyclase activity was dependent on Mn^{2+}; it was increased by sodium azide (NaN_3), $CaCl_2$, cysteine, secretin, and cholecystokinin, but it was not influenced by gastrin, histamine, cholinergic esters, or prostaglandins E_1 and A_1. NaN_3 (1 mM) decreased the apparent K_m for $MnCl_2$ and potentiated the effects of $MgCl_2$. The activity of the particulate fraction represented about 14% of that of the supernatant fraction. The guanylate cyclase activity of that fraction was not modified by NaN_3, gastrin, cholinergic agents, secretin, or cholecystokinin. Cysteine inhibited its activity. These data do not support the hypothesis that cyclic GMP acts as a second messenger for the action of cholinergic agents and gastrin in the guinea pig gastric mucosa.

2723 GASTRIC MUCOSAL DAMAGE BY TAURINE AND GLYCINE CONJUGATES OF CHENODEOXYCHOLIC ACID. (Eng.) Black, R. B.; Naylor, F.; Stenhouse, N. S. (Queen Elizabeth Hosp., Woodville, South Australia 5011, Australia). *Am. J. Dig. Dis.* 22(12):1106-1108; 1977.

To determine whether the greater bile acid-induced gastric mucosal damage seen at an acid pH is dependent upon the type of bile acid conjugation, pure 10 mM solutions of taurine and glycine conjugates of chenodeoxycholic acid were instilled into canine Heidenhain pouches. Solutions were prepared at pH 2, 4, and 8. The pH effect was confirmed, but only with respect to movement of Na^+ ion for taurine conjugates. The magnitude of the changes in ionic movements was much greater with pure bile acid solutions than that seen previously with whole bile. The greater damage seen below the pK_a of the bile acid conjugates suggests that its nonionized form is the more damaging.

2724 EFFECT OF PROTEOLYTIC ENZYMES ON THE BINDING OF COBALAMIN TO R PROTEIN AND INTRINSIC FACTOR: IN VITRO EVIDENCE THAT A FAILURE TO PARTIALLY DEGRADE R PROTEIN IS RESPONSIBLE FOR COBALAMIN MALABSORPTION IN PANCREATIC INSUFFICIENCY. (Eng.) Allen, R. H.; Seetharam, B.; Podell, E.; Alpers, D. H. (Univ. Colorado Medical Center, Denver, CO 80262). *J. Clin. Invest.* 61(1):47-54; 1978.

To test the hypothesis that R protein acts as an inhibitor of cobalamin (Cbl) absorption and that pancreatic proteases are required to alter R protein and prevent such inhibition, the ability of R protein and intrinsic factor (IF) to compete for Cbl binding, and the ability of pancreatic proteases to alter this competition, were studied. Human salivary R protein bound Cbl with affinities that were 50- and 3-fold higher than those of human IF at pH 2 and 8, resp. Cbl bound to IF was transferred to an equal amount of R protein with half times of 2 and 90 min at pH 2 and 8, resp., and within several hours the respective ratios of R protein-Cbl/IF-Cbl of 50 and 2 were observed. Cbl bound to R protein was not transferred to IF at either pH 2 or 8. Incubation of R protein with pancreatic proteases at pH 8 led to a 150-fold decrease in its affinity for Cbl. Incubation of R protein-Cbl with pancreatic proteases led to complete transfer of Cbl to IF within 10 min. Gel filtration studies with R protein-^{57}Co-Cbl and ^{125}I-R protein showed that pancreatic proteases partially degraded R protein. Pancreatic proteases differed in their ability to effect these changes with trypsin>chymotrypsin>elastase. Pancreatic proteases did not alter IF in any of the parameters mentioned above. Pepsin failed to alter either R protein or IF. These studies suggest: (a) that Cbl is bound almost exclusively to R protein in the acid milieu of the stomach, rather than to IF; (b) that Cbl remains bound to R protein in the slightly alkaline environment of the intestine until pancreatic proteases partially degrade R protein and enable Cbl to become bound exclusively to IF; and (c) that the primary defect in Cbl absorption in pancreatic insufficiency is a lack of pancreatic proteases and a failure to alter R protein and effect the transfer to Cbl to IF. These studies also suggest that the partial correction of Cbl malabsorption observed with bicarbonate is due to neutralization of gastric HCl, since at slightly alkaline pH, IF can partially compete with R protein for the initial binding and retention of Cbl.

2725 INFLUENCE OF BETA RECEPTOR BLOCKADE ON PENTAGASTRIN-STIMULATED GASTRIC SECRETION. (Ger.) Anschelwitsch, J.; Okun, K. (Therapeutische Hospitalklinik, Medizinische Institut Riga, Bulv. Padomju 12, Riga, USSR). *Dtsch. Z. Verdau. Stoffwechselkr.* 37(5/6):219-223; 1977.

The effect of beta receptor blockade by propranolol (4 mg, i.v.) on the gastric secretion induced by pentagastrin (6 µg/kg) was studied in 27 men aged 20-50 yr. They included healthy persons and patients with duodenal and gastric ulcers. Propranolol was administered immediately before pentagastrin. While pentagastrin alone reduced the pH of the gastric juice by 1.3-1.4 units, it had no pH-reducing effect during beta receptor blockade. Propranolol significantly reduced the stimulating effect of pentagastrin on gastric secretion; the volume of the gastric juice decreased by 50%, the hydrochloric acid content by 35%, the hydrochloric acid concentration by 23%, and the quantity of pepsin by 72%. The proteolytic enzyme secretion was 124.6 mg/hr following pentagastrin stimulation, and 72.2 mg/hr following pentagastrin stimulation under beta receptor blockade. The findings indicate the great significance of beta-adrenergic processes in the secretory effect of pentagastrin.

2726 EFFECT OF SUB-DIAPHRAGMATIC VAGOTOMY ON GASTRIC MUCOSAL MAST CELL POPULATION IN PYLORUS LIGATED RATS. (Eng.) Ganguly, A. K.; Sathiamoorthy, S. S.; Bhatnagar, O. P. (Government Medical Coll., Surat-395 001, India). *Q. J. Exp. Physiol.* 63(1):89-92; 1978.

The role of the vagus in the development of experimental stress ulcers was assessed by studying the gastric mucosal mast cell population following subdiaphragmatic vagotomy in albino rats, 6 and 12 hr after pylorus ligation, or in control rats with a sham-vagotomy. Subdiaphragmatic vagotomy significantly increased the gastric mucosal mast cell population in both 6- and 12-hr groups (from 189 ± 9 cells/mm^2 gastric mucosa in controls to 269 ± 8 cells/mm^2 6 hr after ligation, $p<0.001$; from 129 ± 7 to 322 ± 10 cells/mm^2 12 hr after ligation, $p<0.001$). The results suggest that the vagal impulses act on the gastric mucosal mast cells causing their degranulation. Following vagotomy, the contents stay bound within the mast cells. The increase in the mast cell population 12 hr after pylorus ligation may have been due to the continuation of normal turnover of the mast cells in the

gastric mucosa. The results do not support the conclusion that the vagal influence on mast cell population is similar throughout the gastrointestinal tract.

2727 THE PARATHYROID GLANDS IN EXPERIMENTALLY INDUCED HYPERGASTRINEMIA IN THE RAT. (Eng.) Grimelius, L.; Johansson, H.; Lundqvist, G.; Olazabal, A.; Polak, J. H.; Pearse, A. G. E. (Dept. Pathology, Univ. Uppsala, P.O. Box 553, S-751 22 Uppsala, Sweden). *Scand. J. Gastroenterol.* 12(6):739-744; 1977.

To determine the importance of hypergastrinemia in the development of hyperparathyroidism, the morphology of the parathyroids in male Sprague-Dawley rats with hypergastrinemia, induced by antral exclusion, was compared with that of glands from untreated rats and animals from which the main source of gastrin-17 was excluded by antral resection. Fourteen weeks after induction of hypergastrinemia, the volume of the parathyroids was significantly increased in comparison with that in controls ($0.001<p<0.01$), owing to hyperplasia of the parenchymal cells. Removal of the antral gastrin-producing capacity of the same duration was not accompanied by any significant changes in the parathyroids. These findings suggest that hypergastrinemia could be a stimulus for the development of hyperplasia of the parathyroids, and that it may be an etiological factor in the production of hyperparathyroidism.

2728 DOES ACID BACK DIFFUSION AND DILUTION REDUCE THE CONCENTRATION OF ACID SECRETED BY THE PARIETAL CELL [Abstract]? (Eng.) Thompson, M. R.; Gipsman, M. (Manchester Royal Infirmary, Manchester, England). *Gut* 18(11):A948; 1977.

2729 EFFECT OF PROLONGED METIAMIDE MEDICATION ON ACID SECRETORY CAPACITY AND GASTRIN SENSITIVITY OF THE RAT PARIETAL CELL [Abstract]. (Eng.) Halter, F.; Hacki, W. H.; Hacki, S. K.; Witzel, L. (Inselspital, Bern, Switzerland). *Gut* 18(11):A948; 1977.

2730 FAILURE TO DETECT BACK-DIFFUSION IN HUMAN GASTRIC ASPIRATE [Abstract]. (Eng.) Whitfield, P. F.; Hobsley, M. (Middlesex Hosp. and Medical Sch., London, England). *Gut* 18(11):A947-A948; 1977.

2731 DEMONSTRATION OF GASTRIN BINDING SITES IN THE RAT STOMACH [Abstract]. (Eng.) Brown, J.; Galagher, N. D. (Royal Prince Alfred Hosp., Camperdown, New South Wales, Australia). *Clin. Exp. Pharmacol. Physiol.* 4(5):480-481; 1977.

2732 A COMPARISON OF THE EFFECTS OF STABLE ENDOPEROXIDE ANALOGUES WITH PGE_2 AND $PGF_{2\alpha}$ ON RAT GASTRIC SECRETION, IN VIVO AND IN VITRO [Abstract]. (Eng.) Frame, M. H.; Main, I. H. M. (Sch. Pharmacy, London Univ., 29/39 Brunswick Square, London WC1N 1AX, England). *Br. J. Pharmacol.* 61(3):450P; 1977.

2733 CLASSIFICATION OF THE β-ADRENOCEPTORS THAT MEDIATE INHIBITION OF PENTAGASTRIN-INDUCED GASTRIC ACID SECRETION IN THE DOG [Abstract]. (Eng.) Daly, M. J.; Long, J. M.; Stables, R. (Dept. Pharmacology, Allen and Hanburys Res. Ltd., Ware, Hertfordshire SG12 0DJ, England). *Br. J. Pharmacol.* 61(3): 462P; 1977.

2734 HISTAMINE OUTPUT FROM THE RAT ISOLATED GASTRIC MUCOSA DURING ACID SECRETION STIMULATED BY PENTAGASTRIN, METHACHOLINE AND DIBUTYRYL CYCLIC ADENOSINE 3',5'-MONOPHOSPHATE [Abstract]. (Eng.) Main, I. H. M.; Pearce, J. B. (Sch. Pharmacy, Univ. London, 29/39 Brunswick Square, London WC1N 1AX, England). *Br. J. Pharmacol.* 61(3): 461P; 1977.

2735 INTRACELLULAR ASPECTS OF GASTRIN SECRETION [Abstract]. (Eng.) Bastie, M. J.; Senegas, F.; Balas, D.; Pradayrol, L.; Frexinos, J.; Ribet, A. (INSERM, U 151, C.H.U. de Rangueil, 31054 Toulouse, France). *Digestion* 16(1/2):203; 1977.

2736 EFFECT OF CHRONIC SECRETIN, PENTAGASTRIN AND CHOLECYSTOKININ ON STOMACH OF RATS [Abstract]. (Eng.) Petersen, H.; Solomon, T.; Crossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):484; 1977.

2737 STIMULATION OF THE ENDOGENOUS CYCLIC AMP-PRODUCTION IN ISOLATED GASTRIC MUCOSAL CELLS [Abstract]. (Eng.) Sonnenberg, A.; Moran, J.; Fisher, J. A.; Blum, A. L. (Stadtspital Triemli, Zurich, Switzerland). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):485; 1977.

2738 PEPSIN STIMULATION BY GASTROINTESTINAL HORMONES IN THE CAT [Abstract]. (Eng.) Vagne, M.; Perret, G.; Desvigne, C. (INSERM U 45, Pav. Hbis, Hopital E. Herriot, 69430 Lyon Cedex 2, France). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):485-486; 1977.

2739 THE EFFECTS OF GASTRIC DISTENSION ON ACID SECRETION IN MAN [Abstract]. (Eng.) Olbe, L.; Bergegardh, S.; Grotzinger, U.; Schoon, I. M. (No affiliation given). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):486-487; 1977.

2740 FORMATION OF GASTRIN COMPONENT IV IN CAT ANTRA [Abstract]. (Eng.) Blair, E. L.; Hammill, A.; Lund, P. K.; Sanders, D. J. (Physiology Dept., Univ. Newcastle, Newcastle-upon-Tyne NE1 7RU,

England). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):490; 1977.

2741 EFFECT OF CALCIUM ON ACID SECRETION BY THE ISOLATED RAT GASTRIC MUCOSA [Abstract]. (Eng.) Main, I. H. M.; Pearce, J. B. (Sch. Pharmacy, Univ. London, 29/39 Brunswick Square, London WC1N 1AX, England). *Br. J. Pharmacol.* 61(1):124P; 1977.

2742 STIMULATION OF GASTRIC ACID SECRETION BY INTRAVENOUS AMINO ACIDS [Abstract]. (Eng.) Konturek, S. J.; Tasler, J.; Cieszkowski, M. (Inst. Physiology, Medical Acad., Cracow, Poland). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):491-492; 1977.

2743 DAMAGE AND REPAIR OF THE GASTRIC MUCOSA IN RATS FOLLOWING SHORT TERM ADMINISTRATION OF CORTISONE [Abstract]. (Eng.) Ellen, W. A.; Hopman, P. J.; Klopper. (Academic Hosp. "Wilhelmina Gasthuis," Amsterdam, Netherlands). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):492; 1977.

2744 BIOSYNTHESIS OF GASTRIN BY RAT ANTRAL POLYSOMES [Abstract]. (Eng.) Strunz, U.; Legler, U. F.; Schmack, B.; Sewing, K. F. (Dept. Medicine, Univ. Erlangen-Nurnberg, Nurnberg, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):492-493; 1977.

2745 COMPARISON BETWEEN GSP AND HYPOXANTHINE ON GASTRIC SECRETION IN DOGS [Abstract]. (Eng.) Lepeltier, M.; Sauvage, M.; Vatier, J. (INSERM U 10, Hopital Bichat, 170 Bd Ney, 75877 Paris, Cedex 18, France). *Digestion* 16(1/2):214; 1977.

2746 MECHANISM OF THE INHIBITION OF ACID SECRETION AND GASTRIN RELEASE BY THE JEJUNUM IN DOGS [Abstract]. (Eng.) Carpentier, Y.; Melon, C.; Woussen-Colle, M. C.; De Graef, J. (Hopital Saint-Pierre, B-1000 Brussels, Belgium). *Digestion* 16 (1/2):205-206; 1977.

2747 EFFECT OF 2-DEOXYGLUCOSE ON GASTRIC SECRETION AND ANTRAL MUSCLE CONTRACTION BEFORE AND AFTER HIGHLY SELECTIVE VAGOTOMY IN DOGS [Abstract]. (Eng.) Boiselle, J. C.; Roze, C.; Vatier, J. (INSERM U 10, Hopital Bichat, 170 Bd Ney, 75877 Paris, Cedex 18, France). *Digestion* 16(1/2):204-205; 1977.

2748 CIRCADIAN VARIATION OF SERUM GASTRIN LEVEL AND CELL RENEWAL IN JEJUNAL MUCOSA DURING FAST IN RATS [Abstract]. (Eng.) Berard, A.; Chayvialle, J. A. P.; Pansu, D. (INSERM U 45, Pav. H bis, Hopital E.-Herriot, 69374 Lyon, Cedex 2, France). *Digestion* 16(1/2):203-204; 1977.

See also, 2639, 2698, 2701, 2708, 2715, 2763, 2767, 2863, 2881, 2885, 2931, 2932, 2934, 3004, 3045, 3051, 3065, 3066, 3068, 3071, 3077, 3079, 3086, 3100, 3103, 3105, 3107, 3109, 3115, 3122, 3124, 3125, 3126, 3127, 3128, 3132, 3418, 3424.

SECRETION AND METABOLISM

Pancreas

2749 INTRACELLULAR DIVALENT CATION RELEASE IN PANCREATIC ACINAR CELLS DURING STIMULUS-SECRETION COUPLING. II. SUB-CELLULAR LOCALIZATION OF THE FLUORESCENT PROBE CHLOROTETRACYCLINE. (Eng.) Chandler, D. E.; Williams, J. A. (Dept. Physiology, Univ. California, San Francisco, CA 94143). *J. Cell Biol.* 76(2):386-399; 1978.

Subcellular distribution of the divalent cation-sensitive probe chlorotetracycline (CTC) was observed by fluorescence microscopy in isolated mouse pancreatic acinar cells, dissociated rat hepatocytes, frog rod photoreceptors, and human RBC. In each cell type, areas containing membranes fluoresced intensely while areas containing no membranes (nuclei and zymogen granules) were not fluorescent. Cell compartments packed with rough endoplasmic reticulum or Golgi vesicles (acinar cells) or plasma membrane-derived membranes (rod outer segments) exhibited a uniform fluorescence. In contrast, cell compartments having large numbers of mitochondria (hepatocytes and the rod inner segment) exhibited a punctate fluorescence. Punctate fluorescence was prominent in the perinuclear and perigranular areas of isolated acinar cells during CTC efflux, suggesting that, under these conditions, mitochondrial fluorescence may account for a large portion of acinar cell fluorescence. Fluorometry of dissociated pancreatic acini, preloaded with CTC, showed that the application of the mitochondrial inhibitors antimycin A, NaCN, rotenone, or carbonyl cyanide *m*-chlorophenylhydrazone, or of the divalent cation ionophore A23187 (all agents known to release mitochondrial calcium) rapidly decreased the fluorescence of acini. In the case of mitochondrial inhibitors, this response could be elicited before but not following the loss of CTC fluorescence induced by bethanechol stimu-

lation. Removal of extracellular Ca^{2+} and Mg^{2+} or the addition of EDTA also decreased fluorescence but did not prevent secretagogues or mitochondrial inhibitors from eliciting a further response. These data suggest that bethanechol acts to decrease CTC fluorescence at the same intracellular site as do mitochondrial inhibitors. This effect could be due to release of calcium from either mitochondria or another organelle that requires ATP to sequester calcium.

2750 IN VITRO ACTION OF BOMBESIN ON AMYLASE SECRETION, MEMBRANE POTENTIAL, AND MEMBRANE RESISTANCE IN RAT AND MOUSE PANCREATIC ACINAR CELLS: A COMPARISON WITH OTHER SECRETAGOGUES. (Eng.) Iwatsuki, N.; Petersen, O. H. (Univ. Dundee Medical Sch., Dundee DD1 4HN, Scotland). *J. Clin. Invest.* 61(1):41-46; 1978.

The effect of bombesin on the potential difference and resistance across the pancreatic acinar cell membrane was tested, and the effects were compared with those of other known stimulants. In addition, the dynamic profile of amylase output after bombesin and after acetylcholine (ACh) stimulation was compared. Bombesin caused depolarization of rat or mouse pancreatic acinar cell membrane, reduction of membrane resistance, and a steep rise in amylase output from superfused pancreatic fragments. These effects were similar to those previously described for acetylcholine, cholecystokinin, and gastrin. The dose-response curves for these three effects of bombesin were very similar, with effects being detectable at concentrations of about 30 pM and maximal effects at about 10 nM. The equilibrium potential for the membrane action of bombesin (the membrane potential at which bombesin did not cause any change in membrane potential) was -16 mV. Similar values for equilibrium potential were obtained with acetylcholine, cerulein, and pentagastrin. Bombesin in the higher dose range (10 nM) caused electrical uncoupling of acinar cells within an acinus, i.e., a marked increase in junctional membrane resistance. Similar uncoupling effects were observed after acetylcholine, cerulein, and pentagastrin stimulation. Bombesin acts on the pancreatic acinar plasma membrane in exactly the same way as acetylcholine and cholecystokinin-pancreozymin. The electrical uncoupling caused by stimulation is evidence for an increase in cytosol free calcium ion concentration.

2751 INHIBITORY EFFECT OF VARIOUS CYTOSTATICS AND CYCLOHEXIMIDE ON ACUTE EXPERIMENTAL PANCREATITIS IN RATS. (Eng.) Korbova, L.; Kohout, J.; Malis, F.; Balas, V.; Cizkova, J.; Marek, J.; *et al.* (Faculty General Medicine, Charles Univ., Prague, Czechoslovakia). *Gut* 18(11):913-918; 1977.

The effects of drugs that interfere with nucleic acid and protein syntheses on acute experimental pancreatitis were studied in male Wistar rats. Cycloheximide (0.25 mg/kg, s.c.), 5-azacytidine (4.85 mg/kg, s.c.), and 4-methoxybenzoyl-β-bromoacrylate (Cytembena, 2.0 mg/kg, s.c.) blocked the the development of experimental acute pancreatitis that was mediated by the interstitial administration of 5% bile solution into the pancreas *in vivo*. Six hours after drug treatment, the pathological changes, evaluated macroscopically or using histological sections of the pancreas, were significantly decreased. The drugs affected the amount of abdominal fluid and lowered its lipase activity (to 92%, 70%, and 70% of control for Cytembena, 5-azacytidine, and cycloheximide, resp.) and amylase activity (to 70%, 39%, and 64% of control, resp.). The fact that cycloheximide at low doses is relatively nontoxic may permit its clinical use in pancreatitis.

2752 EXPERIMENTAL SERUM PANCREATITIS: ITS PREVENTION WITH CYCLOPHOSPHAMIDE. (Ger.) Nizze, H. (Institut fur Allgemeine und Spezielle Pathologie, Bereich Medizin der Wilhelm-Pieck-Universitat Rostock, Stremplstr. 14, DDR-25 Rostock 1, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 37(5/6):241-246; 1977.

The prophylactic effect of cyclophosphamide (CP) on bovine serum-induced pancreatitis was studied in male AB colony mice. The animals were subdivided into 5 groups: group 1 received only bovine serum (1-2 x 0.3 ml/day, 26 total injections, i.p.); groups 2-4 received the same doses of bovine serum along with CP (4, 7, or 11 injections of 2 mg/day i.p.), while group 5 received CP only. The length of the treatment was 13 days. The animals of group 1 developed typical serum pancreatitis (pronounced interstitial lymphoplasmacytic pancreatitis with abundant peritoneal exudate and marked edema of the pancreas). Pancreatitis was not seen in the groups treated with CP. The findings indicate the prophylactic effect of CP against bovine serum-induced pancreatitis.

2753 STRUCTURAL AND FUNCTIONAL STUDIES ON ISOLATED PANCREATIC DUCT FRAGMENTS IN THE RAT [Abstract]. (Eng.) Folsch, U. R.; Fischer, H.; Soling, H. D.; Creutzfeldt, W. (Dept. Medicine, Univ. Gottingen, Gottingen, W. Germany). *Gastroenterology* 72(5, Part 2):1058; 1977.

2754 FINE STRUCTURAL RELATION BETWEEN PANCREATIC EXCRETORY DUCTULES AND INTERCELLULAR SPACES [Abstract]. (Eng.) Papp, M.; Somogyi, J.; Viragh, Sz.; Szabo, D. (Inst. Experimental Medicine, Hungarian Acad. Sciences, H-1450 Budapest P.O.B. 67, Hungary). *Scand. J. Gastroenterol.* 11(Suppl. 41): 89; 1976.

2755 PROPERTIES OF THE CHOLINERGIC MUSCARINIC RECEPTOR OF ISOLATED RAT PANCREAS PLASMA MEMBRANES AND THE ANTIMUSCARINIC EFFECTS OF QUINUCLIDINYL BENZILATE (QNB) [Abstract]. (Eng.) Ng, K. H.; Poirier, G. G.; Morisset, J. (Gastrointestinal Res. Unit, Univ. Sherbrooke, Sherbrooke, Quebec J1K 2R1, Canada). *Gastroenterology* 72(5, Part 2):1108; 1977.

2756 RELATIONS BETWEEN FASTING AND POSTPRANDIAL PANCREATICO-DUODENAL PRESSURES, PANCREATIC SECRETION AND DUODENAL VOLUME FLOW IN THE DOG [Abstract]. (Eng.) Owyang, C.; Dozois, R. R.; DiMagno, E. P.; Go, V. L. W. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(5, Part 2):1110; 1977.

2757 THE EFFECT OF CHRONIC ALCOHOL INGESTION ON RAT PANCREAS [Abstract]. (Eng.) Reber, H. A.; Johnson, F. E.; Montgomery, C. K.; Carl, W. R.; Wong, M. F. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5, Part 2):1117; 1977.

2758 EFFECT OF ATROPINE AND VAGOTOMY ON THE PANCREATIC POLYPEPTIDE RESPONSE TO A MEAL [Abstract]. (Eng.) Taylor, I. L.; Impicciatore, M.; Walsh, J. H. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1139; 1977.

2759 THE EFFECT OF ATROPINE ON SECRETION RELEASE AND PANCREATIC BICARBONATE SECRETION AFTER DUODENAL ACIDIFICATION IN MAN [Abstract]. (Eng.) Hanssen, L. E. (Ullevaal Hosp., Oslo, Norway). *Acta Endocrinol. (Kbh.)* 85(Suppl. 212):195; 1977.

2760 EFFECTS OF CALCITONIN ON PANCREATIC EXOCRINE SECRETION [Abstract]. (Eng.) Dyck, W. P.; Chiprut, R. O. (Scott and White Clinic, Temple, TX 76501). *Gastroenterology* 72(5, Part 2): 1054; 1977.

2761 EXCHANGEABILITY OF THE SECRETORY CALCIUM POOL IN RABBIT PANCREAS [Abstract]. (Eng.) Schreurs, V. V. A. M.; Swarts, H. G. P.; de Pont, J. J. H. H. M.; Bonting, S. L. (Dept. Biochemistry, Univ. Nijmegen, Nijmegen, Netherlands). *Scand. J. Gastroenterol.* 11(Suppl. 41):95; 1976.

2762 EFFECT OF INTRADUODENAL Ca^{++} AND Mg^{++} ON PANCREATIC SECRETION IN DOGS [Abstract]. (Eng.) Swierczek, J. S.; Llanos, O. L.; Teichmann, R. K.; Schafmayer, A.; Rayford, P. L.; Thompson, J. C. (Univ. Texas Medical Branch, Galveston, TX). *Gastroenterology* 72(5, Part 2):1138; 1977.

2763 COMPARISON OF PORCINE CHOLECYSTOKININ (CCK) AND SYNTHETIC CAERULEIN ON PANCREATIC, BILIARY, AND GASTRIC SECRETION IN MAN [Abstract]. (Eng.) MacGregor, I. L.; Trupin, J.; Hubsher, J. A. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5, Part 2):1092; 1977.

2764 EFFECT OF CHRONIC INJECTION OF COCAINE ON RAT EXOCRINE PANCREAS: A MORPHOLOGICAL AND BIOCHEMICAL STUDY [Abstract]. (Eng.) Morisset, J.; Sakr, F.; Lord, A.; Madarnas, P. (Gastrointestinal Res. Unit, Univ. Sherbrooke, Sherbrooke, Quebec, Canada). *Gastroenterology* 72 (5, Part 2):1105; 1977.

2765 LIPASE AND CO-LIPASE IN INTESTINAL JUICE FOLLOWING A TEST MEAL [Abstract]. (Eng.) Borgstrom, B.; Hildebrand, H. (No affiliation given). *Acta Paediatr. Belg.* 29(2):129; 1976.

2766 ACCELERATED SYNTHESIS DE NOVO OF PHOSPHATIDYLINOSITOLS IN THE RAT EXOCRINE PANCREAS IS NOT NECESSARILY ASSOCIATED WITH ENZYMATIC HYPERSECRETION. SECRETIN AND VASOACTIVE INTESTINAL PEPTIDE (VIP) STIMULATE AMYLASE OUTPUT IN VITRO WITHOUT FAVOURING THIS SYNTHESIS [Abstract]. (Eng.) Calderon, P.; Furnelle, J.; Christophe, J. (Universite Libre de Bruxelles, Laboratoire de Chimie biologique et de la Nutrition, Brussels, Belgium). *Arch. Int. Physiol. Biochim.* 85(2):388-389; 1977.

2767 EFFECT OF PIRENZEPINE, A NEW GASTRIC ACID-INHIBITING AGENT, ON EXOCRINE PANCREATIC SECRETION IN MAN. (Eng.) Brunner, H.; Verita, M.; Polterauer, P.; Grabner, G. (Ordinariat fur Gastroenterologie und Medizinische Computerwissenschaften, Garnisongasse 13, A 1090 Wien, Austria). *Drug Res.* 27(3):684-687; 1977.

2768 SECRETORY GLYCOPROTEINS IN THE RAT EXOCRINE PANCREAS [Abstract]. (Eng.) Vokl, A.; Bieger, W. (Anatomisches Institut der Universitat Heidelberg, Heidelberg Im Neuenheimer Feld 307, W. Germany). *Scand. J. Gastroenterol.* 11(Suppl. 41):96; 1976.

2769 PANCREATIC INSUFFICIENCY ALTERS PROXIMAL, NOT DISTAL MUCOSAL PROTEINS [Abstract]. (Eng.) Kwong, W. (Washington Univ. Sch. Medicine, St. Louis, MO). *Gastroenterology* 72(5, Part 2): 1188; 1977.

2770 DIGESTION OF PROTEINS MEASURED BY POSTPRANDIAL ABSORPTION OF AMINOACIDS IN PIGS SUBJECTED TO DISCONTINUOUS PANCREATIC DERIVATION [Abstract]. (Eng.) Rerat, A.; Corring, T. (INRA 78350 Jouy en Josas, France). *Scand. J. Gastroenterol.* 11(Suppl. 41):93; 1976.

2771 SECRETIN: LACK OF RESPONSE TO ORAL FEEDING [Abstract]. (Eng.) O'Connor, F. A.; Buchanan, K. D.; Henry, W.; Calvert, H. (Dept. Medicine, Queen's Univ., Belfast, Northern Ireland). *Gut* 18(5):A415; 1977.

2772 THE EFFECT OF SOMATOSTATIN (SST) ON ENDOGENOUS RELEASE OF SECRETIN AND PP IN DOG [Abstract]. (Eng.) Gyr, K.; Hacki, W.; Kayaseh, L.; Girard, J.; Rittmann, W. W.; Stalder, G. A. (Kantonsspital Basel, Basel, Switzerland). *Acta Endocrinol.* 85(Suppl. 212):107; 1977.

2773 SULFATED COMPOUNDS IN THE GUINEA PIG PANCREAS [Abstract]. (Eng.) Reggio, H.;

Palade, G. E. (Yale Univ. Medical Sch., 333 Cedar St., New Haven, CT 06510). *Scand. J. Gastroenterol.* 11(Suppl. 41):92; 1976.

2774 DETERMINATION OF HUMAN PANCREATIC CATIONIC TRYPSIN IN SERUM [Abstract]. (Eng.) Geokas, M. C.; Largman, C.; Brodrick, J. W. (Martinez Veterans Admin. Hosp., Davis, CA). *Gastroenterology* 72(5, Part 2):1061; 1977.

2775 PREVENTION OF ENTEROKINASE INDUCED ACUTE PANCREATITIS WITH TRASYLOL AND SOYBEAN TRYPSIN INHIBITOR [Abstract]. (Eng.) Mann, N. S.; Kadian, R. S.; Narenderan, K. (Veterans Admin. Hosp., Louisville, KY). *Gastroenterology* 72(5, Part 2):1097; 1977.

2776 PANCREATIC SECRETION IN HAMSTERS WITH PANCREATIC DUCT OBSTRUCTION [Abstract]. (Eng.) Reber, H. A.; Johnson, F. E.; Wong, M. F.; Carl, W. R. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5, Part 2):1117; 1977.

2777 PANCREATIC HYPERSECRETION FOLLOWING SMALL BOWEL RESECTION. POSSIBLE ROLE IN INTESTINAL ADAPTATION [Abstract]. (Eng.) Gelinas, M. D.; Morin, C. L.; Ling, V.; Bourassa, D. (Hopital Ste-Justine, Universite de Montreal, Montreal, Quebec, Canada). *Gastroenterology* 72(5, Part 2): 1061; 1977.

See also, 2719, 2745, 2947, 3010, 3216, 3223, 3228.

SECRETION AND METABOLISM

Hepatobiliary Tract

2778 STUDIES IN PHARMACOKINETICS AND TOLERANCE OF SUBSTANCES TEMPORARILY RETAINED IN THE LIVER BY MICROSPHERE EMBOLIZATION. (Eng.) Lindell, B.; Aronsen, K. F.; Nosslin, B.; Rothman, U. (Malmo General Hosp., Malmo, Sweden). *Arch. Surg.* 187(1):95-99; 1978.

The effect of microsphere embolization on the retention of inulin in the liver and on the toxicity of 5-fluorouracil (5-FU) was studied in male Wistar-Fur rats. The test substances were injected into the common hepatic artery through a retrograde catheter in the gastroduodenal artery. The injection of 0.5 ml of inulin (1.96 mg/ml aqueous solution) alone into the common hepatic artery produced a rapid elevation of the inulin blood concentration to a maximum of 50-55 µg/ml in 1 min; the concentration then rapidly fell to a level of about 10 µg/ml after 20 min. In contrast, when inulin was injected in combination with 42×10^4 degradable microspheres (19 ± 3.1 µm), the initial high peak in inulin blood concentration failed to appear, and the maximum blood concentration reached was only 20-25 µg/ml ($p=0.01$). The inulin concentration curve in the blood 20 min after the administration of inulin and microspheres was almost identical to the concentration found when inulin was injected alone. The injection of inulin with microspheres also led to a significantly (1% level) delayed excretion of inulin with urine; after 35 min, only 20% of the administered dose was found in the urine compared to 60% of the administered dose when inulin alone was injected. During the first 30 min after the injection of inulin and microspheres, the mean inulin concentration in the liver was raised by 42% ($p=0.05$) compared to when inulin was injected alone. Leukocytopenia, which resulted from the injection of 5-FU (300 mg/kg) alone into rats, was less marked when 5-FU was injected with 126×10^4 microspheres and was reversed at days 4 and 9 when a significantly (1% level) higher number of circulating WBC was found than when 5-FU was injected alone. The survival rate of rats given 5-FU alone was 22% compared with 75% when the drug was injected with microspheres ($p=0.01$). The increased tolerance to 5-FU was probably due to a prolonged first pass effect when the substance was temporarily retained in the liver by microsphere embolization.

2779 ENZYMOLOGY OF HUMAN ALCOHOL METABOLISM. (Eng.) Li, T. K. (No affiliation given). *Adv. Enzymol.* 45:427-483; 1977.

The properties of human liver alcohol dehydrogenase and aldehyde dehydrogenase are reviewed, their role in the physiology of alcohol elimination is assessed, and the findings compared with those from experimental animals. A specific affinity chromatography procedure has been developed that collectively purifies the many molecular forms of alcohol dehydrogenase in high yield. Studies with such preparations have revealed that the enzyme is a dimeric molecule of 85,000 daltons, containing 4 equivalents of zinc/mol protein. Several NAD^+-dependent, unspecific aldehyde dehydrogenases have been found in mammalian livers, some with high K_ms and other with low K_ms for acetaldehyde. The subcellular distribution of these enzymes has been determined, and the mitochondrial low-K_m aldehyde dehydrogenase has been identified as the principal enzyme responsible for acetaldehyde elimination in rats. A soluble form of aldehyde dehydrogenase, with a low K_m for acetaldehyde, has been isolated

from human liver homogenates, but its subcellular location and role have not been established. It is postulated that the molecular heterogeneity of alcohol dehydrogenase in liver contributes to individual differences in alcohol-metabolizing capacity; the atypical phenotype of alcohol dehydrogenase has been postulated to underlie alcohol sensitivity. The decreased alcohol dehydrogenase activity seen in cirrhosis may reflect changes in the synthesis, degradation, metal binding, or activity of zinc metalloenzymes. The study of alcohol dehydrogenase and other zinc metalloenzymes in patients with alcoholic liver disease should aid in understanding the cellular pathology and pathogenesis of alcoholic cirrhosis.

2780 INCREASED HEPATIC OXYGENATION FOLLOWING ETHANOL ADMINISTRATION. (Eng.) Shaw, S.; Heller, E. A.; Friedman, H. S.; Baraona, E.; Lieber, C. S. (Bronx Veterans Admin. Hosp., 130 W. Kingsbridge Rd., New York, NY 10468). *Proc. Soc. Exp. Biol. Med.* 156(3):509-513; 1977.

The effects of ethanol on hepatic oxygenation were measured by hepatic vein catheterization in the baboon. Chronic alcohol administration (50% of total caloric intake for 1-4 yr) resulted in slightly lower oxygen tension in the hepatic vein, but not ischemia, when measured after an overnight fast when alcohol was no longer present in the blood. The i.v. administration of ethanol (1.75 g/kg) resulted in an increase in hepatic vein oxygen tension regardless of prior exposure to alcohol or the presence of liver disease. The increased oxygen tension after alcohol was associated with a marked increase in hepatic blood flow. These data in conjunction with the observation of progressive liver injury in the alcohol-fed animals support the concept that alcoholic liver injury can develop despite unimpaired hepatic oxygenation.

2781 PROBING THE ACTIVE SITE OF LIVER ALCOHOL DEHYDROGENASE. (Eng.) Dutler, H. (Laboratorium fur Organische Chemie, ETH Universitatstrasse 6, CH-8006 Zurich, Switzerland). *Biochem. Soc. Trans.* 5(3):617-620; 1977.

Kinetic and modeling studies designed to determine the active site of liver alcohol dehydrogenase are described. The reduction of racemic 2-, 3-, and 4-alkylcyclohexanones with methyl, ethyl, isopropyl, and tertiary-butyl alkyl groups was studied on a preparative scale and under conditions where the coenzyme NADH was continuously regenerated by auxiliary enzymes (glucose-6-phosphate dehydrogenase and aldolase). Product formation was followed by gas chromatography combined with determination of enantiomer composition by nuclear magnetic resonance spectroscopy of the α-methoxy-α-trifluoromethylphenylacetyl esters of the product alcohols. The kinetic method for determining at which position of the cyclohexanone ring an alkyl group leads to favorable or unfavorable intermolecular interactions with the enzyme involved reducing the pairs of enantiomeric alkylcyclohexanones to the four possible alcohols in each case. The kinetically obtained information was then compared with modeling study results to identify groups involved on the side of the active-site pocket of the enzyme. The active-site pocket, including the nicotinamide moiety of the coenzyme, was built with Kendrew-type models, and models of the alkylcyclohexanols formed as products were placed into the active-site pocket such that their hydroxyl oxygen atom appeared in the position where the water oxygen atom was observed in the apoenzyme. The alkylcyclohexanol models were allowed to change their orientation within geometric constraints until full agreement was achieved between the interactions observed in the model and those determined kinetically. In the resulting model, the cyclohexanol rings of all products were superimposed and therefore showed the same orientation relative to the nicotinamide moiety of the coenzyme. Excellent agreement between the modeling study and the kinetic studies was obtained, suggesting that the model of the enzyme-product complex discloses all of the interesting structural features of the enzyme-substrate complex.

2782 SERUM ENZYME ACTIVITIES IN RATS WITH CHRONIC LIVER DAMAGE. COMMUNICATION 2: EFFECT OF ALLYL ALCOHOL. (Ger.) Neubauer, J.; Schieke, S.; Schulz, I.; Skorka, G.; Bien, E. (Institut fur Pharmakologie und Toxicologie, Humboldt-Universitat zu Berlin, Berlin, E. Germany). *Pharmazie* 32(7):406-409; 1977.

The effect of a 20-week treatment with allyl alcohol (0.02 and 0.04 ml/kg/day in 1% and 2% aqueous solutions) on the activities of certain serum enzymes (SGOT, SGPT, glutamate dehydrogenase, lactate dehydrogenase, leucine aminopeptidase, and alkaline phosphatase) was studied in male Wistar rats aged 12-14 weeks at the beginning of the experiment. Allyl alcohol was administered by a probang; the animals received food and water *ad libitum*. The control animals received water only. Severe diarrhea with fatal outcome was observed in 4/42 animals treated with 0.04 ml/kg doses, but there were no visible changes in the other animals. Allyl alcohol caused a significant but transient increase in SGPT (from 28 IU/l to a maximum 53 IU/l after 4 weeks of treatment with the 0.02 ml/kg dose, and to 51 IU/l after 8 weeks of treatment with the 0.04 ml/kg dose) and in glutamate dehydrogenase activity (from 5.4 IU/l in the controls to 18.1 IU/l after 4 weeks of treatment with the 0.02 ml/kg dose, and to 26 IU/l after 8 weeks of treatment with the 0.04 ml/kg dose). The findings indicate the relevance of glutamate dehydrogenase determinations in the detection of liver damage in experimental animals.

2783 EFFECT OF GLUCOCORTICOIDS ON AMINO ACID TRANSPORT IN ISOLATED RAT HEPATOCYTES. (Eng.) Le Cam, A.; Freychet, P. (INSERM U-145, Faculte de Medecine [Pasteur], Chemin de Vallombrose, 06034 Nice Cedex, France). *Mol. Cell. Endocrinol.* 9(2):205-214; 1977.

The effects of glucocorticoids on neutral amino acid

transport were studied in freshly prepared suspensions of isolated hepatocytes from adult rat. Cortisol and dexamethasone at 10 μM stimulated the active transport of α-aminoisobutyric acid by about 40% by increasing the influx. The onset of effect was preceded by a lag period of about 1 hr. Cortisol (ED_{50}=2 μM) was 10-20 times less potent than synthetic analogs. Glucocorticoids increased the V_{max} of transport without affecting the K_m. Actinomycin D and cycloheximide virtually abolished this effect. The glucocorticoid effect involved predominantly the A system of transport. The effect was additive with that of glucagon, insulin, and catecholamines.

2784 INDIVIDUAL BILE ACIDS IN PORTAL VENOUS AND SYSTEMIC BLOOD SERUM OF FASTING MAN. (Eng.) Ahlberg, J.; Angelin, B.; Bjorkhem, I.; Einarsson, K. (Serafimerlasarettet, S-112 83 Stockholm, Sweden). *Gastroenterology* 73(6):1377-1382; 1977.

The serum concentrations of cholic acid (C), chenodeoxycholic acid (CD), and deoxycholic acid (D) were determined, using a highly specific gas chromatographic-mass spectrometric technique, in peripheral venous and portal venous blood from 10 otherwise healthy patients undergoing elective cholecystectomy. The mean C content of the peripheral venous serum was 0.49 ± 0.16 μM; the mean CD and D contents were 1.55 ± 0.32 and 1.44 ± 0.57 μM, resp. Arterial serum, obtained from five of the subjects, did not show any differences in bile acid concentrations compared to venous serum. In contrast, the portal venous content of each bile acid was several-fold greater, 6.14 ± 1.20 μM of C, 8.40 ± 1.84 μM of CD, and 6.18 ± 2.27 μM of D. The hepatic uptake of C was estimated to be about 90%, whereas that of CD and D was lower, about 70%. This difference in hepatic uptake between the individual bile acids was reflected in the relative composition of the total bile acids, which was 30:39:31 (C:CD:D) in portal venous serum and 13:50:37 in peripheral serum. Compared to common duct bile obtained simultaneously, the portal vein contained a greater proportion of CD. It is suggested that the higher fasting level of CD compared to C in peripheral serum may result from the combination of a lower fractional hepatic extraction and a higher portal venous input to the systemic circulation.

2785 SERUM BILE ACID LEVELS: A COMPARTMENTAL MODEL FOR THE DYNAMICS OF THE ENTEROHEPATIC CIRCULATION. (Eng.) Hoffman, A. F.; La Russo, N. F.; van Berge-Henegouwen, G. P. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 151-156; 1977.

A multicompartmental model is proposed for the hepatic part of the enterohepatic circulation of bile acids. The model postulates a well-mixed sinusoidal compartment, one constant fraction passes into the hepatocyte and the remainder enters the peripheral plasma compartment. The flux of any bile acid entering the peripheral plasma compartment at any moment is equal to (1-first pass hepatic clearance) x that bile acid flux to the liver. The total spillover of bile acids into the peripheral plasma compartment is the sum of the individual spillovers. This model explains why the level of serum bile acids in peripheral blood rises postprandially, why interruption of the enterohepatic circulation causes a fall in serum bile acids, and why fasting-state serum bile acids are enriched in chenodeoxycholic acid when compared to fasting-state biliary bile acids.

2786 INFLUENCE OF CHEMICAL STRUCTURE ON HEPATOCELLULAR UPTAKE OF BILE ACIDS. (Eng.) Reichen, J.; Preisig, R.; Paumgartner, G. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 113-123; 1977.

The kinetics of uptake of ^{14}C-labeled cholic, taurocholic, and chenodeoxycholic acids were studied in the perfused rat liver by the multiple-indicator dilution technique. All three bile acids exhibited saturation kinetics. The maximal uptake velocity (V_{max}) was similar for the trihydroxy bile acids taurocholate (20.8 nmol/sec/g liver) and cholate (24.9 nmol/sec/g liver); it was only half this value for the dihydroxy bile acid, chenodeoxycholate (11.4 nmol/sec/g liver). The apparent half-saturation constant, K_m, was 100% higher for the unconjugated bile acid cholate (526 nmol/g liver) than for its conjugated analog, taurocholate (258 nmol/g); it was similar for chenodeoxycholate (236 nmol/g) and for taurocholate. It is assumed that the difference in the apparent K_m reflects intrinsic differences in the affinity of different bile acids for the hepatic carrier. The findings suggest that (1) the hepatic uptake of chemically different bile acids is compatible with carrier-mediated transport, (2) the maximal uptake velocity is higher for trihydroxy than for dihydroxy bile acids and is not influenced by conjugation, and (3) the affinity of bile acids for the transport system is higher for dihydroxy than for trihydroxy bile acids and higher for conjugated than for unconjugated bile acids.

2787 VARIATION IN BILE COMPOSITION AND SERUM LIPIDS DURING THE MENSTRUAL CYCLE. (Eng.) Low-Beer, T. S.; Wicks, A. C. B.; Heaton, K. W.; Durrington, P.; Yeates, J. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 183-190; 1977.

To determine if there are fluctuations in bile cholesterol saturation and consequently in the risk of forming gallstones during the cycle, biliary lipid composition and fasting serum cholesterol and triglyceride levels were measured during the normal menstrual cycle in 11 healthy, regularly menstruating women not taking oral contraceptives. Measurements were made the day after bleeding had

stopped, at midcycle, and 8-9 days after midcycle. Cholesterol saturation of bile, and therefore the risk of developing gallstones, was greater 8-9 days after midcycle than at the end of bleeding. Serum triglyceride and cholesterol levels fell over the 8-9 days after midcycle; triglyceride levels were 0.59 ± 0.07, 0.67 ± 0.06, and 0.52 ± 0.04 mM and cholesterol levels were 3.97 ± 0.01, 3.92 ± 0.16, and 3.63 ± 0.16 mM at the end of menstruation, at midcycle, and at 8-9 days after midcycle, resp. These changes in serum and biliary lipid composition are probably due to a direct effect of sex hormones on the liver.

2788 REAPPRAISAL OF CHOLESTEROL SOLUBILIZATION IN BILE SALT-LECITHIN SOLUTION AND THE STABILITY OF BILE. (Eng.) Furusawa, T.; Nakama, T.; Itoh, H.; Hisadome, T. (Faculty Medicine, Kyushu Univ., 3-1-1 Maidashi, Higashi-ku, Fukuoka-shi, 812 Japan). *Gastroenterol. Jpn.* 12(4):253-262; 1977.

Cholesterol solubility in aqueous solutions containing lecithin and bile salts in a 1:3 ratio by weight was studied. Both the rate and magnitude of cholesterol solubilization were found to be markedly greater in systems where a cholesterol and lecithin mixture was solubilized by the bile salt than in systems where cholesterol crystals were solubilized in an aqueous bile salt-lecithin solution. An almost linear relation was found between the quantity of solubilized cholesterol and the bile salt concentration when sodium deoxycholate was used as the bile salt; however, a slight deviation from a straight line was observed at lower bile salt concentrations (75 mM or less) when systems employing sodium cholate, sodium chenodeoxycholate, or sodium cholate-deoxycholate as bile salts were used. Thus, a partial straight line was drawn by the method of least squares, and the slope of the graph representing quantity of solubilized cholesterol as a function of bile salt concentration was calculated. The values of the slope for cholate, chenodeoxycholate, deoxycholate, and mixed equimolar cholate-deoxycholate systems were 5.85×10^{-2}, 7.60×10^{-2}, 9.50×10^{-2}, and 7.17×10^{-2}, resp. This order of values was the same as that obtained for bile salt-cholesterol systems without lecithin; however, the values obtained for the systems containing lecithin showed that the solubilizing power of the bile salt was intensified by the addition of lecithin in each system. The solubilized cholesterol:bile salt ratio was also graphed as a function of bile salt concentration, and the saturability of cholesterol solubilization in bile was illustrated when reported data on bile salts and cholesterol in human and animal bile were plotted on this graph.

2789 INTERACTION BETWEEN DRUGS AND CHOLESTEROL METABOLISM IN RAT LIVER SUBCELLULAR FRACTIONS. (Eng.) Mitropoulos, K. A.; Balasubramaniam, S. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 17-24; 1977.

The activities of cholesterol 7α-hydroxylase, ethylmorphine demethylase, and the microsomal concentration of cytochrome P-450 were compared in rat livers subsequent to the following *in vivo* treatments: phenobarbitone (100 mg/kg, i.p.) given on alternate days over 6 days; L-thyroxine (500 μg/kg, i.p.) given daily for 7 days; cholestyramine (5% in the diet) fed for 5 days; or thyroidectomy, portacaval anastomosis, or adrenalectomy performed 2 weeks before the experimental measurements. There was no correlation between the activity of cholesterol 7α-hydroxylase and that of ethylmorphine demethylase or the content of cytochrome P-450, but there was a close correlation between ethylmorphine demethylase activity and the concentration of cytochrome P-450. The presence of ethylmorphine inhibited the activity of cholesterol 7α-hydroxylase and the presence of cholesterol inhibited the activity of ethylmorphine demethylase. The activity of lanosterol 14α-demethylase was also inhibited in the presence of drugs such as ethylmorphine or aniline. Triarimol (α-[2,4-dichlorophenyl]-α-phenyl-5-pyrimidine-methanol), a drug that interacts with cytochrome P-450, was a potent inhibitor of cholesterol 7α-hydroxylase, lanosterol 14α-demethylase, and ethylmorphine demethylase activities. It is possible that liver microsomes contain a number of P-450s, each one specific for a given substrate.

2790 ROLE OF DIETARY CHOLESTEROL ON THE EFFECT OF CHENODEOXYCHOLIC ACID ON BILIARY LIPIDS. (Eng.) Coyne, M. J.; Bonorris, G. G.; Chung, A.; Cove, H.; Schoenfield, L. J. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, MD.: University Park Press): 203-209; 1977.

To determine the effects of differing concentrations of dietary cholesterol on the ability of chenodeoxycholic acid (CDC) to inhibit hepatic hydroxy-methyl-glutaryl-CoA reductase (HMG-CoAR) male golden Syrian hamsters were fed one of the following diets for 1 month: standard diet and CDC, high cholesterol diet with and without CDC, or cholesterol-free diet with and without CDC. The high cholesterol diet increased the concentration of biliary cholesterol and the biliary saturation index from the values observed in hamsters fed the standard diet but had no effect on bile acid or phospholipid concentrations. CDC administration significantly decreased the concentration of biliary cholesterol and the biliary saturation index from levels seen in hamsters on the standard diet and on the high cholesterol diet but had no effect on biliary acid or phospholipid concentrations. CDC had no effect on the concentration of biliary lipids or the biliary saturation index in the hamsters on the cholesterol-free diet. The hamsters receiving the high cholesterol diet and CDC had an HMG-CoAR activity less than that seen in hamsters receiving CDC and a standard diet. CDC administration to hamsters fed the cholesterol-free diet resulted in HMG-CoAR activity greater than the activity associated with CDC-treated hamsters on the standard diet. It is concluded that di-

etary cholesterol is necessary for optimum CDC inhibition of HMG-CoAR. Dietary cholesterol alterations may be one cause for the failure of CDC dissolution of gallstones because high cholesterol and cholesterol-free diets prevent the maximum CDC decrease of the biliary saturation index.

2791 CONVERSION OF 5β-CHOLESTANE INTERMEDIATES (3α,7α,26-TRIOL,3α,7α,25-TRIOL AND 3α,7α-DIOL) TO CHOLIC AND CHENODEOXYCHOLIC ACIDS IN MAN. (Eng.) Vlahcevic, Z. R.; Schwartz, C. C.; Cohen, B. I.; Gregory, D. H.; Halloran, L. G.; Kuramoto, T.; *et al. In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 49-58; 1977.

The efficiency of the conversion of the 5β-cholestane derivatives 3α,7α,26-triol,3α,7α-diol (both ^{3}H-labeled), and 3α,7α,25-triol (^{14}C-labeled) to cholic acid and chenodeoxycholic acid (CDCA) was examined by mixing the derivatives with albumin and giving the mixtures i.v. to postcholecystectomized patients who had balloon occludable T-tubes. The patients had acholic stools and no deoxycholic acid was found in bile, suggesting a completely interrupted enterohepatic cycle. The transformation of the injected labeled precursors was evaluated from the secretion rates of cholic acid and CDCA, the value of bile secreted per time period, and the specific activities of these respective bile acids. 5β-Cholestane-3α,7α,26-triol was efficiently converted to cholic acid and CDCA. The formation of cholic acid from this precursor suggests that hydroxylation at the 12 position is not hindered by the presence of a hydroxyl group at C-26. The efficient conversion of 5β-cholestane-3α,7α,26-triol and -3α,7α-diol into both cholic acid and CDCA in proportions similar to those observed for endogenously synthesized bile acids suggests that these 5β-cholestane derivatives may be major intermediates in the synthesis of cholic acid and CDCA. 5β-Cholestane-3α,7α,25-triol was poorly converted to bile acids, suggesting that this intermediate can be hydroxylated at the C-12 position to a limited extent. The quantitative contribution of this pathway to cholic acid synthesis is probably not very significant.

2792 TECHNIQUES FOR STUDYING LITHOCHOLIC ACID METABOLISM IN MAN. (Eng.) Allan, R. N.; van Berge-Henegouwen, G. P.; Hoffman, N. E.; Hofmann, A. F. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 161-165; 1977.

Factors involved in the development of techniques for accurate studies of lithocholic acid metabolism in man are considered. Simultaneous kinetic studies in gallstone patients and healthy volunteers indicated that (24-^{14}C)-lithocholate is a better label than (11,12-^{3}H)-lithocholate because it is more stable during enterohepatic cycling. Early bile acid pool sampling is essential for kinetic studies to avoid underestimating the specific activity at zero time and thus overestimating the pool size. Measurement of radioactivity in bile samples is done using standard methods. Preparative steps must include complete recovery of bile acid sulfates; complete hydrosolvolysis can be achieved by mild alkaline hydrolysis in nickel bombs using nordeoxycholic acid as an internal standard. Because of the complex kinetics involved, the most accurate estimates of the input and size of the total exchangeable lithocholate pool were obtained by using the Hamilton-Stewart equations. Lithocholate biotransformation studies are best done by i.v. administration of labeled bile acid with determination of the chemical form of radioactivity in bile samples by thin-layer chromatography. These techniques have been used to demonstrate that, during chenic acid ingestion, the lithocholate input and the size of the exchangeable pool in gallstone patients is four to five times that observed in healthy controls.

2793 THE METABOLISM OF URSODEOXYCHOLIC ACID IN MAN. (Eng.) Salen, G.; Fedorowski, T.; Colallilo, A.; Tint, G. S.; Mosbach, E. H. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 167-172; 1977.

The metabolism of ursodeoxycholic acid (UDCA) was investigated in man by feeding five subjects 1 g/day UDCA and another five subjects 1 g/day chenodeoxycholic acid (CDCA), all for 3 weeks. Biliary and fecal bile acid compositions were determined, biliary cholesterol saturation was measured, and the pool size and production rate of ursodeoxycholic acid was calculated after (24-^{14}C)-ursodeoxycholic acid was given i.v. as a pulse-label. Two weeks after administration, UDCA was the major biliary bile acid; the concentration of lithocholic acid was unchanged. When CDCA was given, 64% of the bile acids were CDCA and the concentration of lithocholic acid in the bile doubled. Following CDCA treatment, most of the fecal bile acids were present as their bacterial metabolites. Fewer bacterial derivatives were present in the feces when UDCA was given. This finding suggests that intestinal bacteria metabolize the 7β-hydroxy group of UDCA differently than the 7α-hydroxy group of CDCA. This difference in metabolism results in the formation of less lithocholic acid and fewer side-effects (stool frequency and serum transaminase levels) following UDCA treatment. During UDCA treatment, cholesterol saturation in the bile decreased significantly suggesting that UDCA, like CDCA, may be an effective litholytic agent.

2794 PRODUCTION OF COLLAGEN AND ACIDIC GLYCOSAMINOGLYCANS BY AN EPITHELIAL LIVER CELL CLONE IN CULTURE. (Eng.) Sakakibara, K.; Umeda, M.; Saito, S.; Nagase, S. (Inst. Medical Science, Univ. Tokyo, Shirokanedai, Minatoku, Tokyo, 108, Japan). *Exp. Cell Res.* 110(1):159-165; 1977.

Experiments were carried out to determine whether

a rat liver cell clone, which is known to produce collagen fibers *in vitro*, also produces glycosaminoglycans. The epithelial cell line produced collagen *in vitro* as early as 10 days after inoculation of the cells. The amount of collagen in the cell layers increased linearly with time after the cultures reached a saturation density. Two kinds of acidic glycosaminoglycans, hyaluronic acid and dermatan sulfate, were detected from the same cell layers by the combined method of electrophoresis and enzymic hydrolysis. Quantitative analysis by densitometry with an electrophorogram showed a rapid increase of both sulfated and nonsulfated glycosaminoglycans occurring concurrently with an accumulation of collagen. Histochemical stainings revealed that the majority of Alcian blue-positive materials was located outside the cells, where argyrophilic fibers could be found. These data are consistent with results obtained from biochemical experiments on cirrhotic rat livers, suggesting that liver parenchymal cells are responsible for an accelerated production of both collagen and glycosaminoglycans in liver cirrhosis.

2795 THE ROLE OF THE LIVER IN BIOSYNTHESIS OF THE NONVITAMIN K-DEPENDENT CLOTTING FACTORS. (Eng.) Workman, E. F., Jr.; Lundblad, R. L. (Dept. Pathology and Biochemistry, Univ. North Carolina, Chapel Hill, NC). *Semin. Thromb. Hemostas.* 4(1):15-28; 1977.

The role of the liver in the biosynthesis of the procoagulant proteins (factor V, VIII, XI, XII, and XIII, fibrinogen, prekallikrein, and high molecular weight kininogen), of proteins involved in fibrinolysis (plasminogen and plasminogen activator), and of the inhibitors, antithrombin III, α_2-macroglobulin, and α_1-antitrypsin is reviewed. The liver is the primary site of fibrinogen synthesis. There is evidence to support the role of fibrinogen degradation products in enhancing fibrinogen synthesis in some animal systems. Free fatty acid/albumin ratio may play a role in the increased fibrinogen synthesis observed during disseminated intravascular coagulation. Factor VIII appears to be synthesized primarily in the liver endothelial cells. Factor XIII activity (a-chain) may be synthesized at a variety of sites (megakaryocytes, spleen, uterus), while b-chain synthesis is probably confined to the liver. Factor V also appears to be synthesized by the liver, as evidenced by the decrease of its plasma concentration in patients with liver damage and its presence in perfusates from isolated rat liver. It is likely that the synthesis of factors XIII and XI, prekallikrein, and high molecular weight kininogen occur in the liver, but no direct evidence is available. Plasma antithrombin III levels decreased in all studied cases of severe hepatic failure both with and without evidence of disseminated intravascular coagulation, suggesting that the liver participates in antithrombin III synthesis. Embryonic hepatic tissue synthesizes α_2-macroglobulin, but the plasma level of this inhibitor is elevated in patients with severe liver disease, suggesting the existence of extrahepatic sites of synthesis. α_1-Antitrypsin also appears to be synthesized at least in part by the liver.

2796 EFFECT OF ESTROGEN ON LIVER DAMAGE. (Eng.) Inokawa, H. (Nihon Univ. Sch. Medicine, Nihon, Japan). *Nihon Univ. J. Med.* 18(2):75-89; 1976.

The effects of estrogen and ACTH fatty degeneration and fibrosis of the liver were studied in female rats receiving a choline-deficient diet. Both castrated and noncastrated rats were injected (3 times/week, i.p.) with estrogen (0.02% or 0.2% solution given in doses of 0.05 ml or 0.1 ml per 100 g body weight) or ACTH (IU/10 ml solution, dose of 0.05 ml/100 g body weight). The animals were sacrificed 1 or 2 months after the start of the study. The estrogen had a mild protective effect against fatty liver, which is induced by a choline deficient diet but it appeared to induce liver fibrosis. ACTH, however, protected against liver fibrosis in noncastrated rats but increased the development of fatty liver in rats on the choline-deficient diet. Estrogen suppressed the production of serum mucoprotein.

2797 REVERSAL OF ETHINYL ESTRADIOL-INDUCED HYPOCHOLESTEROLEMIA AND CHOLESTASIS BY TRITON WR-1339. (Eng.) Davis, R. A.; Showalter, R. B.; Kern, F., Jr. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October 1976.* (Baltimore, MD: University Park Press): 25-31; 1977.

To examine hepatic lipid composition in relation to estrogen-impaired liver function, male Sprague-Dawley rats were injected s.c. daily with ethinyl estradiol (5 mg/kg/day) for 5 days to produce maximal hypocholesterolemia, after which they were injected with Triton WR-1339 (22.5 mg/100 g). Some rats were killed 15 hr after Triton WR-1339 injection for determination of hepatic cholesterol concentration and microsomal cholesterol acyl-CoA transferase; other rats were used for bile flow measurements. Ethinyl estradiol caused hepatic cholesterol concentrations to double but had no effect on free cholesterol levels. Triton WR-1339 reduced the concentration of hepatic cholesterol esters to normal levels. Addition of Triton WR-1339 to hepatic microsomal fractions from ethinyl estradiol-treated rats inhibited cholesterol esterification in a log-linear dose relationship, suggesting that Triton lowers hepatic cholesterol ester concentrations by inhibiting the activity of this enzyme. The rate of bile flow, which was reduced by 50% in ethinyl estradiol-treated rats, was restored to control values by Triton. It is concluded that Triton WR-1339 reverses estrogen-induced hepatic cholesterol ester accumulation and also reverses two impaired hepatic functions: hypocholesterolemia and decreased bile salt independent bile flow. The data support the concept that, in part, estrogens alter hepatic function through the pleiotropic effects secondary to increased microsomal cholesterol acyl-CoA transferase activity.

2798 THE EFFECT OF SECRETIN AND CHOLECYSTOKININ-PANCREOZYMIN ON THE SECRETION OF BILE IN

THE ANAESTHETIZED RABBIT. (Eng.) Esteller, A.; Lopez, M. A.; Murillo, A. (Dept. Animal Physiology, Univ. Granada, Granada, Spain). *Q. J. Exp. Physiol.* 62(4):353-359; 1977.

The effects of secretin and cholecystokinin-pancreozymin (CCK-PZ) on the secretion of bile in anesthetized rabbits were studied. Single injections of secretin (5.0 U/kg, i.v.) significantly increased the flow of bile irrespective of whether the cystic duct was free or had been tied. A sustained increase in bile flow was obtained by the continuous infusion of secretin. CCK-PZ was effective in increasing the bile flow in doses of 1.0 U/kg. Much of the effect could be attributed to contraction of the gallbladder, but a significant increase in flow could still be elicited after ligation of the cystic duct. These findings strongly suggest that the biliary secretion in rabbits is not as different from the general pattern as has previously been suggested.

2799 CYSTIC CHOLANGIOFIBROSIS OF THE LIVER. (Eng.) Dominis, M.; Damjanov, I. (Bolnica O. Novosel, Zajeeva ul. 19, Zagreb, 41000 Yugoslavia). *Arch. Geschwulstforsch.* 47(7):661-669; 1977.

Hepatic cysts in rats fed acetylaminofluorene were studied ultrastructurally to further characterize the lesion and its histogenesis. The cysts were lined by cuboidal or flattened epithelium or both and resembled bile ductular cells. Most of the flattened cells showed adaptive and degenerative changes indicative of pressure atrophy. The cuboidal cells lining the smaller ducts showed ultrastructural signs of activity. Similar "active" cells were seen in the outpouchings of the larger cysts. These data indicate that the cysts are of cholangiocellular origin. Ultrastructurally, the cells forming the cysts showed no signs of anaplasia and more likely represent the end point of bile ductular proliferation rather than a stage in the development of biliary neoplasia.

2800 ULTRASTRUCTURAL ASPECTS OF BILIRUBIN ENCEPHALOPATHY IN COCHLEAR NUCLEI OF THE GUNN RAT. (Eng.) Jew, J. Y.; Williams, T. H. (Dept. Anatomy, Univ. Iowa, Iowa City, IA 52240). *J. Anat.* 124(3):599-614; 1977.

Ultrastructural changes occurring in the cochlear nuclei of Gunn rats with bilirubin encephalopathy were studied. Twenty-one homozygous Gunn rats (2 days to 7 months old) with conspicuous jaundice and/or symptoms of central nervous system disease were compared with normal Sprague-Dawley rats and heterozygous Gunn rats of appropriate age. Blocks containing the ventral cochlear nuclei and the dorsal cochlear nucleus were removed from the fixed brain and processed for electron microscopy by staining with uranyl acetate and lead citrate. Ultrastructural abnormalities were observed in all age groups of homozygous rats, being least severe in the 2- to 4-day old animals. Mitochondrial alterations were observed in 2-day-old rats. The amount of alpha and beta glycogen particles in mitochondria of large neurons increased with age. Some large ex-mitochondrial sacs in close proximity to glycogen filled vacuoles were observed. Dilated profiles of rough endothelial reticulum also contained glycogen particles. Elaborated myelin figures surrounded tongues of cytoplasm and vacuoles and degenerative elements were observed in the cytoplasm of some large neurons. It seems very likely that, in bilirubin encephalopathy, bilirubin affects primarily membrane functions, especially in the mitochondria.

2801 THE EFFECT OF D-GALACTOSAMINE ON LCAT SECRETION AND ULTRASTRUCTURE OF ISOLATED RAT HEPATOCYTES. (Eng.) Nordby, G.; Schreiner, B.; Berg, T.; Norum, K. R. (Sch. Medicine, Univ. Oslo, Blindern, Oslo, Norway). *Acta Pathol. Microbiol. Scand.* [*A*] 85(6):839-849; 1977.

The effect of D-galactosamine on the morphology and secretory activity of isolated rat hepatocytes was studied. Hepatocytes prepared from male Wistar rats were cultured *in vitro*. Cell viability was assayed and protein secretion estimated by measuring radioactivity in a precipitate derived from cultures incubated with [$U^{14}C$]protein hydrolysate. The activity of the secreted lecithin:cholesterol acyltransferase (LCAT) was determined. Total and unesterified cholesterol were estimated by gas liquid chromatography. The glycerol and the triacylglycerol were measured fluorimetrically. The secretion of LCAT from isolated hepatocytes was almost completely blocked when 5 mg/ml of galactosamine was added to the culture. The effect was measurable after 30 min of incubation but it was higher after 3-5 hr. After 3 hr of incubation with galactosamine, there was a slightly lowered secretion of both free cholesterol and triacylglycerol. Galactosamine inhibited the secretion of labeled proteins from the hepatocytes. Viability of the cells was unaffected by the addition of galactosamine. A striking feature of galactosamine-treated hepatocytes was the appearance of dilated lysosomes that were formed by the selective uptake of galactosamine or its metabolites. A large amount of glycogen was observed in cells incubated with both uridine and galactosamine. Galactosamine-treated rat hepatocytes may be a useful model for the study of the interrelationships between LCAT and lipoprotein secretion.

2802 ENANTIOMERS AS PROBES FOR IN VIVO INVESTIGATION OF THE MOLECULAR BASIS OF BIOTRANSFORMATION [Abstract]. (Eng.) Kupfer, A.; Bircher, J. (Dept. Clinical Pharmacology, Univ. Berne, Berne, Switzerland). *Digestion* 14(5/6): 463-464; 1976.

2803 PLASMAPERFUSION OF CHARCOAL-COATED GLASS BEADS--AN APPROACH TO HEPATIC EXCRETORY FAILURE [Abstract]. (Eng.) Lauterburg, B. H.; Dickson, E. R.; Pineda, A. A.; Carlson, G.; Taswell, H. F. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(5, Part 2):1087; 1977.

2804 GROWTH OF NORMAL MURINE LIVER CELLS ON ARTIFICIAL CAPILLARIES [Abstract]. (Eng.) Carman, R.; Hager, J. C.; Thayer, W. R.; Panol, G.; Galletti, P. M. (Rhode Island Hosp., Providence, RI). *Gastroenterology* 72(5, Part 2):1036; 1977.

2805 THE EFFECT OF MAGNESIUMASPARTATE ON PRESERVATION OF THE RAT LIVER. (Eng.) Holscher, B.; Donecker, R.; Gauss, G. (Chirurg. Univ.-Klinik und Poliklinik, Hindenburgdamm 30, D-1000 Berlin 45, W. Germany). *Arzneim. Forsch.* 27(I,1): 77-82; 1977.

2806 PERMEABILITY OF RAT LIVER LYSOSOME MEMBRANES. (Eng.) Baccino, F. M.; Zuretti, M. F. (Istituto di Patologia Generale, Corso Raffaello 30, 10125 Torino, Italy). *Panminerva Med.* 18(11/12):472-491; 1976.

2807 GENETIC DETERMINANTS OF HEPATIC DRUG METABOLISM [Abstract]. (Eng.) Cooksley, W. G. E.; Hart, P.; Farrell, G. C.; Powell, L. W. (Dept. Medicine, Univ. Queensland, Brisbane, Australia). *Gastroenterology* 72(5, Part 2):1040; 1977.

2808 AMINOPYRINE BREATH TEST IN DRINKING ALCOHOLICS [Abstract]. (Eng.) Iber, F. L.; Krause, S. (Veterans Admin. Hosp., Baltimore, MD). *Gastroenterology* 72(5, Part 2):1074; 1977.

2809 THE HEPATIC CONTRIBUTION TO SERUM AMYLASE LEVELS [Abstract]. (Eng.) Renner, T. G.; Reitherman, R.; Hoefs, J.; Douglas, A. P. (Univ. Southern California Sch. Medicine, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1119; 1977.

2810 PROALBUMIN AND ALBUMIN SYNTHESIS IN HUMAN LIVER TISSUE [Abstract]. (Eng.) Lundholm, K.; Lindstedt, G.; Lundberg, P. A.; Schersten, T. (Surgical Metabolic Res. Lab. Univ. Goteborg, Goteborg, Sweden). *Digestion* 14(5/6):462-463; 1976.

2811 STUDIES OF THE HEPATIC UPTAKE OF CONJUGATED BILIRUBIN IN THE RAT [Abstract]. (Eng.) Shupeck, M. (Liver Unit, Natl. Inst. Arthritis, Metabolic, Digestive Diseases, Bethesda, MD 20014). *Gastroenterology* 72(5, Part 2):1189; 1977.

2812 SYNTHESIS OF THE BILE ACID POOL OF THE FETAL SHEEP [Abstract]. (Eng.) Smallwood, R. A.; Hardy, K. J.; Hoffman, N. E. (Dept. Medicine, Univ. Melbourne, Melbourne, Australia). *Gastroenterology* 72(5, Part 2):1133; 1977.

2813 LIVER CELL HETEROGENEITY AND BILE SECRETION IN THE RAT [Abstract]. (Eng.) Gumucio, J. J.; Balabaud, C. P.; Miller, D. L.; Appelman, H. D. (Dept. Internal Medicine, Univ. Michigan, Ann Arbor, MI). *Gastroenterology* 72(5, Part 2):1066; 1977.

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2815 DISCREPANCIES IN METASTABILITY BETWEEN NORMAL AND ABNORMAL HUMAN BILES AND IN BILE ANALOGS. [Abstract]. (Eng.) Holan, K. R.; Marsh, M.; Corbusier, C.; Holzbach, R. T. (Cleveland Clinic Foundation, Cleveland, OH). *Gastroenterology* 72(5, Part 2):1071; 1977.

2816 EFFECT OF AGING ON BILIARY LIPID COMPOSITION AND BILE ACID METABOLISM IN NORMAL CHILEAN WOMEN [Abstract]. (Eng.) Valdivieso, V.; Palma, R.; Severin, C.; Antezana, C.; Contreras, A. (Dept. Gastroenterology, Universidad Catolica de Chile, Santiago, Chile). *Gastroenterology* 72 (5, Part 2):1144; 1977.

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N. R.; Van Thiel, D. H. (Dept. Medicine, Univ. Pittsburgh, Pittsburgh, PA). *Gastroenterology* 72(5, Part 2):1088; 1977.

2823 INCREASED CHOLESTEROL AND BILE ACID EXCRETION DURING A HIGH FIBER DIET [Abstract]. (Eng.) Avgerinos, G. C.; Fuchs, H. M.; Floch, M. H. (Norwalk Hosp., Norwalk, CT). *Gastroenterology* 72(5, Part 2):1026; 1977.

2824 STEROID-INDUCED BILE ACID SYNTHESIS AND SECRETION IN THE FETAL RAT [Abstract]. (Eng.) Richey, J. E.; Little, J. M.; Van Thiel, D. H.; Lester, R. (Dept. Medicine, Univ. Pittsburgh, Pittsburgh, PA). *Gastroenterology* 72(5, Part 2): 1119; 1977.

2825 REVERSAL BY TRITON WR-1339 OF THE EFFECTS OF ETHINYL ESTRADIOL (EE) ON CHOLESTEROL AND BILE ACID (BA) METABOLISM IN THE RAT [Abstract]. (Eng.) Davis, R. A.; Kern, F., Jr. (Univ. Colorado Medical Sch., Denver, CO). *Gastroenterology* 72(5, Part 2):1045; 1977.

2826 ETHINYL ESTRADIOL (EE) INDUCED BILE SECRETORY FAILURE: REVERSAL OF ABNORMAL LIVER SURFACE MEMBRANE (LSM) LIPID COMPOSITION AND BILE ACID (BA) TRANSPORT WITH TRITON WR-1339 [Abstract]. (Eng.) Gonzalez, M. C.; Davis, R. A.; Simon, F. R. (Univ. Colorado Medical Center, Denver, CO). *Gastroenterology* 72(5, Part 2):1184; 1977.

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2828 EFFECT OF TAURODEOXYCHOLATE ON FLUID TRANSPORT (IN VIVO) AND MUCOSAL CYCLIC AMP CONTENT (IN VITRO) IN RABBIT GALLBLADDER [Abstract]. (Eng.) Mertens, R. B.; Mayer, S. E.; Wheeler, H. O. (Dept. Medicine, Univ. California, San Diego, CA). *Gastroenterology* 72(5, Part 2): 1101; 1977.

2829 FAILURE OF TAUROCHOLATE (TC) TO REGULATE ITS RATE OF SYNTHESIS IN EXPERIMENTAL DIABETES: THE ROLE OF INSULIN [Abstract]. (Eng.) Nervi, F.; Severin, C.; Valdivieso, V. (Dept. de Gastroenterologia, Universidad Catolica, Santiago, Chile). *Gastroenterology* 72(5, Part 2):1107; 1977.

2830 TRACER STUDIES ON SERUM FREE FATTY ACID AND HEPATIC TRIGLYCERIDE TURNOVER IN CONTROL AND ETHANOL-TREATED RATS [Abstract]. (Eng.) Wilson, J. F. (Case Western Reserve Univ., Cleveland, OH 44106). *Diss. Abstr. Int.* [*B*] 38(2):670B-671B; 1977.

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2832 ETHANOL: A GONADAL TOXIN IN THE FEMALE [Abstract]. (Eng.) Gavaler, J. S.; Van Thiel, D. H.; Lester, R. (Dept. Medicine, Univ. Pittsburgh, Pittsburgh, PA). *Gastroenterology* 72 (5, Part 2):1060; 1977.

2833 RELATIVE UTILIZATION OF FATTY ACIDS FOR SYNTHESIS OF KETONE BODIES AND COMPLEX LIPIDS IN THE LIVER OF DEVELOPING RATS. (Eng.) Yeh, Y. Y.; Streuli, V. L.; Zee, P. (St. Jude Children's Res. Hosp., Memphis, TN 38101). *Lipids* 12(4):367-374; 1977.

2834 INFLUENCE OF FASTING-REFEEDING AND DIETARY LINOLEATE ON LIVER GLUCOSE-6-PHOSPHATE DEHYDROGENASE AND PHOSPHOLIPID FATTY ACID COMPOSITION IN RATS ADAPTED TO A PURIFIED DIET. (Eng.) Williams, M. A.; Tinoco, J.; Ojakian, M. A.; Clark, L. (Dept. Nutritional Sciences, Univ. California, Berkeley, CA 94720). *Lipids* 12(4):386-392; 1977.

2835 EXPERIMENTAL FATTY LIVER: I. PRODUCTION AND PREVENTION OF FATTY LIVER IN RATS FED CLOFIBRATE AND OROTIC ACID DIETS. II. REVERSAL OF OROTIC ACID-INDUCED FATTY LIVER BY CLOFIBRATE FEEDING [Abstract]. (Eng.) Novikoff, P. M. (New York Univ., New York, NY 10003). *Diss. Abstr. Int.* [*B*] 37(9):4279B; 1977.

2836 A CORRELATED MORPHOMETRIC AND FUNCTIONAL STUDY OF LIVERS OF CLOFIBRATE-TREATED YOUNG VIRGIN AND RETIRED BREEDER RATS [Abstract]. (Eng.) Anthony, L. E.; Schmucker, D. L.; Jones, A. L. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5, Part 2):1025; 1977.

2837 GLUCOCORTICOID REGULATION OF HEPATIC (Na-K) ATPase [Abstract]. (Eng.) Miner, P. B.; Sutherland, E.; Simon, F. R. (Univ. Colorado Medical Center, Denver, CO). *Gastroenterology* 72(5, Part 2):1103; 1977.

2838 THE INTERRELATIONSHIP BETWEEN HEPATIC MICROSOMAL CHOLESTEROL 7α-HYDROXYLASE AND MIXED FUNCTION OXIDASE SYSTEMS [Abstract]. (Eng.) Mellon, W. S. (Ohio State Univ., Columbus, OH 43210). *Diss. Abstr. Int.* [*B*] 38(2):603B; 1977.

2839 HUMAN LIVER FERRITIN: TUMOR-SPECIFIC ALTERATIONS IN STRUCTURE AND ANTIGENICITY [Abstract]. (Eng.) Snyder, D. (Harvard Medical Sch., Boston, MA). *Gastroenterology* 72(5, Part 2): 1189; 1977.

2840 PROTECTIVE EFFECTS OF ALPHA-TOCOPHEROL ON THE HEPATOTOXICITY OF D-GALACTOSAMINE. (Eng.) Mihas, A. A.; Doos, W.; Gibson, R. G.; Hirschowitz, B. I. (Dept. Medicine, Univ. Alabama, Birmingham, AL). *Ala. J. Med. Sci.* 13(4):384-387; 1976.

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2842 ACTION OF ACETYLCHOLINE ON THE GLYCOGEN AND TRIGLYCERIDE CONTENTS OF THE ISOLATED PERFUSED RAT LIVER. (Eng.) Lemberg, A.; Gilardoni, A.; Schon, M.; Feldman, L.; Vullioud, G.; Campel, R. (Sch. Pharmacy and Biochemistry, Buenos Aires Univ., Buenos Aires, Argentina). *Arq. Gastroenterol.* 13(4):229-234; 1976.

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2844 ASCORBIC ACID AND HEME SYNTHESIS IN DEFICIENT GUINEA PIG LIVER. (Eng.) Rikans, L. E.; Smith, C. R.; Zannoni, V. G. (Univ. Michigan Medical Sch., Ann Arbor, MI 48109). *Biochem. Pharmacol.* 26(8):797-799; 1977.

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2846 CHARACTERIZATION OF THE EARLY MOLECULAR ALTERATIONS OF LIVER MICROSOMAL LIPIDS FOLLOWING CCl_4 INTOXICATION. (Eng.) Benedetti, A.; Casini, A.; Ferrali, M.; Comporti, M. (Istituto di Patologia Generale, Via Laterino 8, 53100 Siena, Italy). *Parminerva Med.* 18(11/12):433-440; 1976.

2847 THE MECHANISM OF ALTERATION OF LIPID METABOLISM BY PORTACAVAL SHUNT [Abstract]. (Eng.) Reichle, F. A.; Reichle, R. M.; David, J. S. K. (Temple Univ. Health Science Center, Philadelphia, PA 19140). *Gastroenterology* 72(5, Part 2):1118; 1977.

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2849 HEPATIC SULFOBROMOPHTHALEIN CLEARANCE IN CHILDREN. (Eng.) Licastro, R.; Fagundes Neto, U.; Rua, E. C. (Prof. Alejandro Posadas Policlinic, Haedo, Buenos Aires Province, Argentina). *Arq. Gastroenterol.* 13(4):273-277; 1976.

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2853 MODIFICATION OF ACUTE HEPATIC INJURY BY AN ANTI-ENDOTOXIN [Abstract]. (Eng.) Leibowitz, A. I.; Nolan, J. P. (State Univ. New York, Buffalo, NY). *Gastroenterology* 72(5, Part 2):1184; 1977.

2854 AN ANIMAL MODEL OF FULMINANT HEPATIC FAILURE (FHF) [Abstract]. (Eng.) Blitzer, B. L.; Waggoner, J. G.; Jones, E. A.; Gralnick, H.; Towne, D.; Butler, J.; *et al.* (Natl. Inst. Arthritis, Metabolic, Digestive Diseases, Bethesda, MD). *Gastroenterology* 72(5, Part 2):1180; 1977.

2855 HEPATIC LYSYL OXIDASE ACTIVITY IN EXPERIMENTAL HEPATIC FIBROSIS [Abstract]. (Eng.) Siegel, R. C.; Chen, K. H.; Aguiar, J. M. (Dept. Medicine, Univ. California, San Francisco, CA). *Gastroenterology* 72(5, Part 2):1131; 1977.

2856 ETHYL ALCOHOL DURING HEPATITIS TYPE B INFECTION [Abstract]. (Eng.) Tabor, E.; Gerety, R. J.; Barker, L. F.; Zuckerman, A. J.; Howard, C. R. (Bureau Biologics, Food and Drug Admin., Bethesda, MD). *Digestion* 14(5/6):552; 1976.

2857 THE EFFECTS OF ALCOHOL AND PARTIAL PORTAL LIGATION ON THE IMMUNE SYSTEM OF THE RAT [Abstract]. (Eng.) Slone, F. L.; Smith, W. I., Jr.; Van Thiel, D. H. (Univ. Pittsburgh, Pittsburgh, PA 15261). *Gastroenterology* 72(5, Part 2):1189; 1977.

2858 CANALICULAR HYPERCHOLERESIS FOLLOWING COMPLETE BILIARY OBSTRUCTION IN THE RAT [Abstract]. (Eng.) Accatino, L.; Contreras, A.; Fernandez, M. S.; Quintana, C. (Dept. Gastroenterology, Universidad Catolica de Chile, Santiago, Chile). *Gastroenterology* 72(5, Part 2):1024; 1977.

2859 CELL AUTOPHAGY OF THE LIVER IN STARVATION AND UNDERNUTRITION. (Eng.) Krustev, L. P. (Center of Hygiene, Dimitar Nestorov St. 15, Sofia 31, Bulgaria). *Bibl. Nutr. Dieta* (23):145-154; 1976.

2860 ALTERED PROTEIN SYNTHESIS IN THE LIVER DUE TO NUTRITIONAL INFLUENCES. (Eng.) Sibransky, H. (Univ. South Florida, Coll. Medicine, Tampa, FL 33620). *Panminerva Med.* 18(11/12):422-426; 1976.

2861 MODIFICATION OF LIVER REGENERATION BY AMMONIA AND PLASMA FROM PATIENTS WITH FULMINANT HEPATIC FAILURES (FHF) [Abstract]. (Eng.) Ellis, W. R.; Chur, P. K.; Williams, R.; Murray-Lyon, I. M. (Charing Cross Hosp., London, England). *Digestion* 14(5/6):557; 1976.

2862 ETHANOL SUPPRESSES ^{3}H-THYMIDINE INCORPORATION INTO DNA IN REGENERATING RAT LIVER. DOES IT SUPPRESS HEPATIC REGENERATION [Abstract]? (Eng.) Rayyes, A. N.; Holt, P. R.; Frank, W. O. (St. Luke's Hosp. Center, New York, NY). *Gastroenterology* 72(5, Part 2):1176; 1977.

See also, 2640, 2645, 2648, 2691, 2692, 2763, 2911, 2916, 2936, 2939, 2941, 2942, 2943, 2947, 2962, 2963, 2964, 3048, 3260, 3268, 3305, 3359, 3361, 3383, 3385, 3390, 3391, 3393, 3394, 3395, 3398.

SECRETION AND METABOLISM

Intestine

2863 ROLE OF GASTROINTESTINAL HORMONES IN THE RESPONSE TO MASSIVE RESECTION OF THE SMALL BOWEL. (Eng.) Barros D'Sa, A. A. B.; Buchanan, K. D. (Queen's Univ. Belfast, Inst. Clinical Science, Grosvenor Rd., Belfast BT12 6BJ, Northern Ireland). *Gut* 18(11):877-881; 1977.

The effects of a 75% resection of the distal small bowel on the circulating levels of a range of gastrointestinal hormones were investigated in dogs to define the role of these hormones in the hypersecretion of gastric acid and the accelerated intestinal transit observed after massive enterectomy. Basal and meal-stimulated concentrations of insulin, secretin, gastrin, pancreatic glucagon, and total glucagon-like immunoreactivity (GLI) were measured by radioimmunoassay techniques. After resection, significant depletions of basal and stimulated total GLI ($p<0.05$, $p<0.001$) and a significant rise of stimulated gastrin ($p<0.05$) were discovered. These hormonal alterations may produce an important imbalance of humoral influences on gastrointestinal function. It is suggested that these changes may hold a key to the etiology of the complications of massive resection of the small bowel.

2864 PROXIMAL ENTERECTOMY STIMULATES DISTAL HYPERPLASIA MORE THAN BYPASS OR PANCREATICOBILIARY DIVERSION. (Eng.) Williamson, R. C. N.; Bauer, F. L. R.; Ross, J. S.; Malt, R. A. (Massachusetts General Hosp., Boston, MA 02114). *Gastroenterology* 74(1):16-23; 1978.

To help differentiate among the factors responsible for postresectional intestinal hyperplasia, cell proliferation in the distal intestine of male Sprague-Dawley rats was studied after 50% proximal enterectomy or 50% proximal bypass and also after transposition of the duodenal papilla to the mid small bowel. Within 48 hr, all three operations increased RNA and DNA contents in the ileal mucosa 16% to 50% over control values. At 48 hr and 1 week, the response distal to resection exceeded that of bypass or pancreaticobiliary diversion; nucleic acid contents, DNA specific activity, villous height, crypt depth, and luminal circumference were greatest 1 week after resection. By 1 month, however, chemical and histological values after resection were equalled or surpassed by those in the other two groups. In excluded jejunum itself, mucosal atrophy lowered RNA and DNA contents to 60% of control levels 1 month postoperatively. Neither pancreaticobiliary diversion nor proximal enteric bypass produces the same rate of distal hyperplasia as proximal resection. Modest colonic hyperplasia may contribute to intestinal adaptation after proximal enterectomy. Adaptive postresectional cell proliferation appears not to be mediated by intraluminal nutrition or enteric secretions alone; hormonal factors may also be important.

2865 EXPERIMENTAL SHORT GUT: HEPATIC ALTERATIONS AFTER JEJUNOILEAL RESECTION, BYPASS AND VIBRAMYCIN THERAPY. (Eng.) Burney, D. P.; Burnham, S. J.; Hough, A. J.; Scott, H. W. (Vanderbilt Univ. Sch. Medicine, Nashville, TN 37232). *Am. Surg.* 43(12):778-786; 1977.

The hypothesis that *Bacteroides* endotoxin absorbed from the bypassed segment in the end-to-side jejunoileal bypass is the causative factor in postintestinal bypass hepatic failure was tested in 18 dogs

with and without concomitant administration of an oral broad spectrum antibiotic (Vibramycin, 100 mg/day). The study was done in two phases on two groups of dogs. In phase 1, six dogs underwent a greater than 80% jejunoileal resection and end-to-end anastomosis of 24 inches of proximal jejunum to 12 inches of distal ileum. Twelve dogs had no resection but the same degree of bypass. The ileal end of the bypassed segment was anastomosed to the side of the mid-transverse colon; the proximal end of the bypassed small bowel was closed and sutured to the mesentery. Six of the latter 12 dogs received the antibiotic. All dogs had progressive weight loss followed by stabilization and normal liver function test, hemograms, and liver biopsies during the 6-month observation period. In the 12 bypass-operated dogs, bacterial cultures for aerobes and anaerobes showed identical flora, irrespective of antibiotic therapy. The bowel was then shortened further in all dogs (phase 2) to leave only 16 inches of small gut (10 inches of duodenum and proximal jejunum plus 6 inches of distal ileum) from pylorus to cecum. Antibiotic therapy was continued as before for six dogs. Dogs subjected to resection in phase 1 showed essentially normal chemical tests (serum hemoglobin, WBC counts, total protein concentration, serum albumin level, LDH, SGOT, alkaline phosphatase levels, and bilirubin) and liver biopsy results following phase-2 operation; there was one anesthetic death at the second operation and one death from malnutrition 6 months after the reshortening. Chemical and histologic (e.g., hepatic steatosis and cellular necrosis) evidence of hepatic failure developed in all 12 bypass-operated dogs, both with and without antibiotic therapy. Multiple aerobic and anaerobic bacteria were demonstrated in all dogs. Three resected dogs and three bypass-operated dogs each yielded one *Bacteroides* species. No bacterial overgrowth occurred. The results suggest that hepatic disease occurs consistently with severely shortened gut plus jejunoileal bypass, but not with severely shortened gut and jejunoileal resection. These data do not support the theory that hepatic failure results from overgrowth of a specific bacterial strain since antibiotic treatment did not prevent hepatic cellular necrosis or qualitatively alter the bacterial flora cultured from the bypassed segment.

2866 INTESTINAL CALCIUM-BINDING PROTEIN 3 MONTHS AFTER MASSIVE SMALL BOWEL RESECTION IN THE PIGLET. (Eng.) Margolis, A.; Ricour, C.; Harouchi, A.; Guyot, M.; Laouari, D.; Balsan, S. (Hopital des Enfants Malades, 75730 Paris, Cedex 15, France). *Am. J. Clin. Nutr.* 30(2):2041-2046; 1977.

The adaptive changes in intestinal calcium-binding protein and calcium binding activity were studied at resection and 3 months after 90% small bowel resection in piglets and one adult pig. A calcium-binding protein (molecular weight≈11,000) with calcium-dependent electrophoretic mobility was partially purified from mucosal extract of proximal jejunum, mid-gut, and ileum. The concentration of calcium-binding protein and the calcium-binding activity of the intact animals were highest in the proximal jejunal segment and lowest in the ileal segment. After resection in the four surviving animals out of nine, a significant increase in calcium-binding activity was observed in the proximal jejunum and in the distal ileal segment. The change in calcium-binding activity was much more marked in the ileum than the jejunum. These data demonstrate that pig intestinal mucosa possesses an adaptive capacity to increase the synthesis of calcium-binding protein after massive small bowel resection.

2867 MECHANISM OF PRODUCTION OF INTESTINAL SECRETION BY NEGATIVE LUMINAL PRESSURE. (Eng.) Hakim, A. A.; Papeleux, C. B.; Lane, J. B.; Lifson, N.; Yablonski, M. E. (Univ. Minnesota Medical Sch., Minneapolis, MN 55455). *Am. J. Physiol.* 233(5):E416-E421; 1977.

The relationships between luminal hydrostatic pressure and fluid transport by dog jejunum *in vivo* were compared with quantitative predictions from a model proposed for the mechanism of the secretion produced by elevated venous pressure. Hydrostatic pressure and fluid transport were studied in sheets of jejunum inserted in a Wells clamp. According to the model, the secretion produced by increasing venous pressure and the secretion produced by negative luminal pressure are both passive filtrates contingent on a transepithelial pressure of a few centimeters of H_2O. The agreement between the observed and predicted responses to luminal pressure provided strong support for the model. In particular (a) the observations displayed a predicted gross asymmetry in rates of fluid transfer with isotonic fluids, depending on whether the luminal pressure was positive or negative; (b) the observed magnitude of the negative luminal pressure required for the onset of secretion agreed with predictions; and (c) the secretion contained significant amounts of protein at about 25% of the plasma concentration.

2868 LAMINA PROPRIA MACROPHAGES OF INTESTINE OF THE GUINEA PIG: POSSIBLE ROLE IN PHAGOCYTOSIS OF MIGRATING CELLS. (Eng.) Sawicki, W.; Kucharczyk, K.; Szymanska, K.; Kujawa, M. (Sch. Medicine, Chalubinskiego 5, 02-004 Warsaw, Poland). *Gastroenterology* 73(6):1340-1344; 1977.

To test the hypothesis that lamina propria macrophages may play a role in phagocytosis of nuclear material originating from migrating cells of the intestinal mucosa, these macrophages were studied in the guinea pig, mouse, and rat small and large intestines, and in human duodenum. The macrophages of lamina propria were commonly found both in the small and the large intestine of all these species. The frequency of macrophage occurrence was highest in the lamina propria of villus apices of the small intestine and beneath the lining epithelium of the large intestine. In the cytoplasm of lamina propria macrophages localized in those regions, Feulgen-positive (DNA-containing) granules were observed, particularly in the guinea pig intestine. Autoradiography of the latter, 3 to 5 days after [^{3}H]thymidine injection, showed the coincidence of occurrence of labeled Feulgen-positive granules in

the macrophage cytoplasm with the appearance of labeled epithelial cells and sheath-fibroblasts in the region of lamina propria containing the highest accumulation of macrophages, i.e., at the apices of villi of the small intestine and beneath the lining epithelium of the large intestine. Labeled nuclei of macrophages were observed much less frequently than were labeled cytoplasmic granules. No labeled Feulgen-positive granules were seen in macrophages 0.5 hr, 1, 2, or 7 days after [^{3}H]thymidine injection. The lamina propria macrophages may play a role in the phagocytosis of some migrating cells of the intestinal mucosa, most probably of the sheath fibroblasts and/or intra-epithelial lymphocytes.

2869 EFFECTS OF TETRACYCLINE HYDROCHLORIDE ON ALBINO RAT INTESTINAL MUCOSA. (Eng.) Sehgal, A. K.; Chhuttani, P. N.; Habibullah, C. M. (Postgraduate Inst. Medical Education and Res., Chandigarh, India). *J. Indian Med. Assoc.* 68(4): 69-71; 1977.

The effect of tetracycline on rat intestinal mucosa was investigated. Two groups of animals received tetracycline (6 mg/100 g/day) p.o. for 15 days or 2 months, resp., while a control group received placebo. There was an increase in the height of the villi and an increase in the depth of the crypts in the duodenal and jejunal mucosa in both the short-term and long-term drug groups. This effect was reversible. There were few differences in the changes observed in the short-term and long-term groups. There was no change in the epithelial cell height. The cell count in the corium decreased in three regions in the treated animals.

2870 SALVAGE OF ADENOSINE, INOSINE, HYPOXANTHINE, AND ADENINE BY THE ISOLATED EPITHELIUM OF GUINEA PIG JEJUNUM. (Eng.) Kolassa, N.; Stengg, R.; Turnheim, K. (Pharmakologisches Institut, Universitat Wien, Wahringerstr., 13a, A-1090 Vienna, Austria). *Can. J. Physiol. Pharmacol.* 55 (5):1039-1044; 1977.

The metabolism of ^{14}C-labeled adenosine, inosine, hypoxanthine, and adenine (all at 5×10^{-6} M) was studied in isolated epithelium of guinea pig jejunum. When adenosine or adenine was added to the antiluminal side of the epithelium, two-thirds or one-half, resp., of cellular radioactivity was incorporated into the nucleotide fraction, mainly in the form of adenine nucleotides. Nucleotide synthesis from inosine or hypoxanthine was significantly smaller than that from adenosine. By contrast, another metabolic pattern was found after luminal administration of adenosine, inosine, or hypoxanthine; the incorporation rate into the nucleotide fraction was equally high, and the label was recovered in inosine monophosphate (IMP) and adenine nucleotides to about the same extent with all three substrates. Purine riboside (10^{-4} M) significantly depressed nucleotide formation from adenosine, with respect to IMP formation in particular, while no change was observed in inosine or hypoxanthine salvage. The results suggest compartmentation of the enzymes of purine metabolism within the intestinal mucosa.

2871 PROPRANOLOL INHIBITS BILE ACID AND FATTY ACID STIMULATION OF CYCLIC AMP IN HUMAN COLON. (Eng.) Coyne, M. J.; Bonorris, G. G.; Chung, A.; Conley, D.; Schoenfield, L. J. (Cedars-Sinai Medical Center, 8700 Beverly Blvd., Los Angeles, CA 90048). *Gastroenterology* 73(5):971-974; 1977.

The effect of bile acids, fatty acids, catecholamines, and propranolol on cyclic AMP (cAMP) was studied in human colonic mucosa to study the role of cAMP in bile acid- and fatty acid-induced diarrhea. In normal colonic mucosa obtained at surgery, the effects on cAMP synthesis of 10^{-5} M deoxycholic acid, 10^{-5} M cholic acid, 10^{-5} M 9,10-hydroxystearic acid, 10^{-5} M oleic acid, 10^{-4} M epinephrine, and 10^{-4} M norepinephrine were studied in six experiments. In tissue incubated with 10^{-5} M deoxycholic acid or 9,10-hydroxystearic acid, the effect on cAMP of 10^{-6} M propranolol, with and without 10^{-4} M epinephrine, or 10^{-4} M norepinephrine was studied in six more experiments. Deoxycholic acid increased adenylate cyclase (AC) activity 203% ($p<0.01$), and 9,10-hydroxystearic acid increased AC 236% ($p<0.01$). No other agents stimulated AC. Propranolol decreased basal AC 43% ($p<0.01$), deoxycholic acid stimulated AC 46% ($p<0.01$), and hydrostearic acid stimulated AC 37% ($p<0.01$). Epinephrine or norepinephrine did not reverse these decreases. None of the agents affected phosphodiesterase. Deoxycholic acid and 9,10-hydroxystearic acid stimulate AC in human colonic mucosa, suggesting that bile acid- and fatty acid-induced diarrhea are mediated by the cAMP system. Because propranolol prevents this AC stimulation, propranolol should be investigated as a possible treatment for these diarrheal conditions.

2872 LACK OF CIRCADIAN RHYTHMICITY OF RAT FETAL INTESTINAL ENZYMES AS COMPARED TO THE DAMS. (Eng.) Stevenson, N. R.; Byra, W. M.; Day, S. E. (Rutgers Medical Sch., Piscataway, NJ 08854). *Dev. Biol.* 60(2):487-492; 1977.

To study endogenous rhythms of intestinal enzymes and the need for p.o. and/or intermittent intake for the maintenance of these rhythms, the 24-hr activity patterns of intestinal maltase, lactase, leucylnaphthylamine hydrolyzing activity, γ-glutamyltransferase, and alkaline phosphatase were determined in pregnant rats maintained on a 12-12 light-dark cycle, with feeding during the dark period (1800-0600 hr). The activities of these enzymes plus those of lysosomal maltase and lactase were followed during the same time period in 19- to 20-day-old fetuses. The activity patterns in the dams followed circadian rhythms, with peak activities occurring during the feeding-dark period. These rhythms were similar to the feeding schedule-cued rhythms observed in male rats and, therefore, are assumed to be feeding schedule cued also. In the fetuses, the activities increased in a nonlinear manner throughout the entire 24-hr period, but did

not display a defined rhythm. It is concluded that endogenous intestinal enzyme rhythms do not exist *in utero*, and that p.o. and/or intermittent feeding is necessary for these rhythms to occur.

2873 STIMULATION OF ADENYLATE CYCLASE IN HOMOGENATES OF ISOLATED INTESTINAL EPITHELIAL CELLS FROM HAMSTERS: EFFECTS OF GASTROINTESTINAL HORMONES, PROSTAGLANDINS, AND DEOXYCHOLIC AND RICINOLEIC ACIDS. (Eng.) Gaginella, T. S.; Phillips, S. F.; Dozois, R. R.; Go, V. L. W. (Coll. Pharmacy, Ohio State Univ., Columbus, OH 43210). *Gastroenterology* 74(1):11-15; 1978.

The ability of gastrointestinal hormones to stimulate intestinal adenylate cyclase was studied in isolated small intestinal villus cells of the hamster, because the mechanism by which intestinal secretagogues evoke fluid secretion in the small bowel and colon has been suggested to involve mucosal adenylate cyclase. Adenylate cyclase activity was assayed by conversion of [^{32}P]ATP to [^{32}P]cyclic AMP in a system of pure epithelial cells isolated by vibration in buffer. Vasoactive intestinal peptide and impure cholecystokinin-pancreozymin (but not the 99% pure preparation or pure cholecystokinin octapeptide) were potent stimuli of adenylate cyclase, but pentagastrin, glucagon, secretin, and gastric inhibitory peptide were impotent. Prostaglandins E_1 and E_2 were potent stimuli of adenylate cyclase. Deoxycholic acid and ricinoleic acid were ineffective stimuli of adenylate cyclase. These experiments do not support a clear-cut relation between a compound's ability to stimulate adenylate cyclase and its activity as an intestinal secretagogue.

2874 STIMULATION OF INTESTINAL Ca^{2+}-ATPase ACTIVITY BY CYSTEINE. (Eng.) Matsuda, T.; Maeda, S.; Baba, A.; Iwata, H. (Dept. Pharmacology, Osaka Univ., 133-1, Yamada-kami, Suita-shi, Osaka, Japan). *Life Sci.* 21(7):915-920; 1977.

Small intestinal calcium transport was studied *in vitro* in male Sprague-Dawley rats. Cysteine (0.1 mM) stimulated the activity of the ATPase dependent on Ca^{2+}, but not those dependent on Mg^{2+} and Zn^{2+}, in the microsomal and brush border fractions of the duodenal mucosa. This Ca^{2+}-dependent ATPase was localized in the duodenum but was not present in the jejunum or ileum. Kinetic studies showed that cysteine did not change the K_m value for ATP but decreased that for Ca^{2+}. Glutathione, 2-mercaptoethanol, and dithiothreitol also stimulated the Ca^{2+}-ATPase activity. These findings suggest that thiol-containing reagents stimulate the Ca^{2+}-ATPase activity in the duodenum by affecting the interaction of the enzyme with Ca^{2+}.

2875 GLYCEROL-ESTER HYDROLASE FROM HUMAN SMALL INTESTINE AND ITS POSSIBLE ROLE IN THE DEGRADATION OF NEUTRAL LIPIDS. (Eng.) Negrel, R.; Serrero, G.; Ailhaud, G.; Rey, J. F.; Delmont, J. (Hopital de Cimiez, Nice, France). *Digestion* 16(1/2):146-159; 1977.

A glycerol-ester hydrolase (GEH, molecular weight of 70,000) was isolated from homogenized, scraped, human jejunal mucosa and identified by polyacrylamide-gel electrophoresis and specific staining, and partially characterized. The enzyme activity was essentially the same along the whole length of the intestinal wall as measured by hydrolytic activity against three substrates (tributyrin, *p*-nitrophenylacetate, and palmityl CoA), using tissues from intestinal biopsies or intestinal fragments. No cross-reaction was observed between GEH and immunoserum against human pancreatic juice, indicating the low contamination by pancreatic enzymes and supporting the intestinal origin of GEH. The optimum pH for GEH activity was 8.0 to 8.5, which excluded the possibility of contamination by acidic lipases of gastric or pharyngeal origin. The presence of neutral detergent increases the stability of activity against tributyrin and *p*-nitrophenylacetate; the coaxial peaks of activity against these substrates suggest that there is a single enzyme involved, the ratio being 3-4.2 along the peak. The thiolester hydrolase activity (against palmityl Co-A) was separated from that of GEH. The ratio of activity against tributyrin versus 1(3)-mono-olein remained constant along the purification, suggesting that hydrolytic activity against long-chain monoglycerides in human intestinal homogenates is caused by the glycerol-ester hydrolase. The enzyme was not completely inhibited by a mixture of bile salts mimicking human bile, so that it should remain at least partially active in the lumen where bile salts are present. There seems to be no significant variation in GEH activity in the jejuna of patients with pancreatic lipase deficiencies due to limited supplies of pancreatic juice; hence, GEH does not seem to respond to environmental factors. Substrates may be soluble (*p*-nitrophenylacetate), micellar (mono-olein), or emulsified (dioctanoin and trihexanoin) in form. Enzyme activity occurs preferentially on short-chain triglycerides and medium-chain diglycerides. Since patients presenting with lipid malabsorption disorders absorb medium-chain triglycerides efficiently, it is likely that there is partial hydrolysis by pharyngeal and pancreatic lipases. The partial glycerides can then be hydrolyzed by the glycerol-ester hydrolase in the lumen or intracellularly. Hence, GEH is postulated to play a role in the absorption of neutral lipids, particularly in pathological situations.

2876 3-HYDROXY-3-METHYLGLUTARYL COENZYME A REDUCTASE IN ISOLATED VILLOUS AND CRYPT CELLS OF THE RAT ILEUM. (Eng.) Merchant, J. L.; Heller, R. A. (Sch. Medicine, Stanford Univ., Stanford, CA 94305). *J. Lipid Res.* 18(6):722-733; 1977.

The localization of 3-hydroxy-3-methylglutaryl coenzyme A reductase (HMG-CoA reductase) in the rat small intestinal villus and crypt cells was accomplished after separating these cells from the mucosal layer by sequential dissociation in a

"dual-buffer" system. Consistent separation was demonstrated by using the marker enzymes alkaline phosphatase (specific to the villus cell) and thymidine kinase (specific to the crypt cell). Cells obtained were 95-100% viable, and no relative difference in lability was observed, as evidenced by the equal distribution of acid phosphatase. This method of cell separation was an improvement over the "scraping" technique that damaged cells severely and produced villus preparations that contained little or no reductase activity. The HMG-CoA reductase specific activity in whole cell homogenates of the ileal villi was 0.47 and of the crypts was 0.27 nmol/min/mg of protein, considerably higher values than have been reported earlier. Also, in comparison to the crypts, the villi incorporated 1.5-fold more [^{14}C]-acetate into sterols, a ratio similar to that describing the distribution of HMG-CoA reductase in the two cell populations. These results unequivocally establish that the villi have higher HMG-CoA reductase activity than do the crypts and confirm an earlier report from this laboratory that the villi are a major site of sterol synthesis. The sterol biosynthetic capacity of the small intestine was highest in the ileum and decreased towards the jejunum. The HMG-CoA reductase specific activity of the ileum averaged 0.30 and that of the jejunum 0.10 nmol/min/mg of protein; however, the cholesterol content of the ileum was slightly lower than the jejunum. These results suggest the possibility that the sterol content of the ileum may largely be due to *in situ* synthesis.

2877 DEVELOPMENT OF INTESTINAL BRUSH BORDER MEMBRANE PROTEINS IN THE RAT. (Eng.)
Seetharam, B.; Yeh, K. Y.; Moog, F.; Alpers, D. H. (Washington Univ. Sch. Medicine, St. Louis, MO 63110). *Biochim. Biophys. Acta* 470(3):424-436; 1977.

The proteins of the intestinal microvillus membrane were studied during postnatal development in the rat (days 12-37). In suckling animals (≤20 days), the majority of alkaline phosphatase, glucoamylase, and lactase activities in the distal half of the intestine were located in the supernatant fraction (100,000 x *g*, 60 min). These enzymes were attached to the membrane from the proximal intestine at all ages. Alkaline phosphatase, maltase, and lactase activities in the supernatant fractions chromatographed in Sephadex G-200 in positions similar to the corresponding membrane enzyme. Corresponding activities for lysosomal counterparts of maltase and lactase present in the supernatant fraction chromatographed differently. The pH optimum of the soluble enzymes was 9.2 for phosphatase and 5.5-6.0 for glycoamylase and lactase. The soluble lactase and alkaline phosphatase were inhibited minimally by *p*-chloromercuribenzoate and sodium fluoride, resp. L-phenylalanine (20 mM) inhibited the soluble phosphatase by 90%. Thus, the soluble enzymes are not mainly of lysosomal origin, but have characteristics of membrane-bound enzymes. Polyacrylamide gel electrophoresis in sodium dodecyl sulfate revealed 18 protein bands that were present in adult membranes. Two other proteins were unique for membranes of distal intestine in suckling rats. The proteins corresponding to known enzyme activity changed as expected with age (e.g., sucrase and maltase activities increased, lactase activity decreased). Most of the other proteins were also altered quantitatively during development. Thus, the changes in the microvillus membrane during development in the rat are not limited to specific enzymes.

2878 INTESTINAL 1,25-DIHYDROXYVITAMIN D_3 BINDING PROTEIN: SPECIFICITY OF BINDING. (Eng.)
Eisman, J. A.; DeLuca, H. F. (Coll. Agricultural and Life Sciences, Univ. Wisconsin-Madison, Madison, WI 53706). *Steroids* 30(2):245-257; 1977.

The binding of metabolites of vitamin D and their analogs to the 3.7S chick intestinal cytosol receptor protein was specifically studied by competitive binding techniques and polyethylene glycol precipitation of the complex. The structural requirements for the interaction between the vitamin D molecule and the receptor were assessed without the nuclear chromatin binding step. 1,25-Dihydroxyvitamin D_3 and 1,25-dihydroxyvitamin D_2 were found to be equally competitive and were the most active. Of the structural features of the compounds, the 1α-hydroxyl was found to be the most important followed by the 25-hydroxyl and the 3β-hydroxyl. The addition of a second hydroxyl near carbon 25 markedly reduced binding, whether on the 26 carbon or the 24 carbon. A hydroxyl on C-24 could substitute to some degree for the 25-hydroxyl, inasmuch as 24-hydroxyvitamin D_3 was much more effective than vitamin D_3 but less effective than 25-hydroxyvitamin D_3. In general, the patterns of binding affinities correlated well with the biological activity of the various analogs, which strongly supports a physiological role for the 1,25-dihydroxyvitamin D_3 binding protein. The results also suggest that, in the two-step receptor mechanism, the structural specificity is located in the initial interaction of the 1,25-dihydroxyvitamin D_3 and the cytosol receptor.

2879 CHANGES IN BLOOD SEROTONIN IN EXPERIMENTAL INTESTINAL OBSTRUCTION IN DOGS. (Eng.)
Ojha, S. C.; Sarkar, F. H.; Khanna, N. N.; Udupa, K. N. (Inst. Medical Sciences, Banaras Hindu Univ., Varanasi 221 005, India). *Indian J. Exp. Biol.* 15(10):931-932; 1977.

Changes in blood serotonin level were examined in dogs with experimental, acute simple, or strangulation obstructions of the proximal jejunum. A statistically significant increase ($p<0.01$) in the serotonin concentration was observed on the third day after acute simple obstruction was produced. In strangulation obstructions, a significant rise was seen 6 and 12 hr after operation ($p<0.01$ and $p<0.025$, resp.) in untreated animals, whereas no significant rise was seen in antibiotic-treated animals. Changes in blood serotonin levels appear to be important in toxemia complicating intestinal obstruction.

2880 FIBRE AND ENTEROHEPATIC CIRCULATION. (Eng.) Eastwood, M. A. (Western General

Hosp., Edinburgh, Scotland). *Nutr. Rev.* 35(3):42-44; 1977.

2881 THE INTERDIGESTIVE MYOELECTRIC COMPLEX IN MAN: EFFECT OF FOOD AND OF HIGH SERUM GASTRIN LEVELS [Abstract]. (Eng.) Janssens, J.; Vantrappen, G.; Hellemans, J. (Dept. Medical Res., Univ. Leuven, Leuven, Belgium). *Gastroenterology* 72(5, Part 2):1161; 1977.

2882 DEMONSTRATION OF NEUROTENSIN-IMMUNOREACTIVE CELLS IN THE GEP-SYSTEM OF MAN AND VARIOUS MAMMALS [Abstract]. (Eng.) Helmstaedter, V.; Feurle, G. E.; Taugner, C.; Forssmann, W. G. (Anatomisches Institut III, Universitat, Heidelberg, W. Germany). *Acta Endocrinol. (Kbh.)* 85(Suppl. 212):104; 1977.

2883 STIMULATION BY IMMUNE COMPLEXES OF MUCUS RELEASE FROM THE GOBLET CELLS OF THE RAT SMALL INTESTINE [Abstract]. (Eng.) Bloch, K. J.; Walker, W. A. (Massachusetts General Hosp., Boston, MA 02114). *Fed. Proc.* 36(3):1054; 1977.

2884 POSSIBLE PRECURSOR RELATIONSHIP BETWEEN GUT GLUCAGON-LIKE IMMUNOREACTIVITY (GLI) AND GLUCAGON [Abstract]. (Eng.) Conlon, J. M.; Murphy, R. F.; Buchanan, K. D. (Dept. Biochemistry, Queen's Univ., Belfast, Northern Ireland). *Gut* 18(5):A410; 1977.

2885 USE OF SYNTHETIC FRAGMENTS FOR SPECIFIC IMMUNOSTAINING OF CCK CELLS [Abstract]. (Eng.) Buchan, A. M. J.; Polak, J. M.; Facer, P.; Bloom, S. R.; Szelke, M.; Hudson, D.; Pearse, A. G. E. (Royal Postgraduate Medical Sch., London, England). *Gut* 18(5):A406; 1977.

2886 IS ETHANOL (Eth) TOXICITY IN THE JEJUNUM DUE TO OSMOTIC DAMAGE [Abstract]? (Eng.) Fox, J. E.; Dinda, P. K.; Beck, I. T. (Queen's Univ. Digestive Diseases Unit, Kingston, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1058; 1977.

2887 INHIBITION OF TESTMEAL AND OIL-INDUCED PANCREOZYMIN RELEASE BY SOMATOSTATIN IN MAN [Abstract]. (Eng.) Schlegel, W.; Raptis, S.; Harvey, R. F.; Oliver, J. M.; Pfeiffer, E. F. (Dept. Internal Medicine, Univ. Ulm, Ulm, W. Germany). *Acta Endocrinol. (Kbh.)* 85(Suppl. 212):106A; 1977.

2888 INHIBITION BY SOMATOSTATIN OF VIP-STIMULATED INTESTINAL SECRETION [Abstract]. (Eng.) Carter, R. F.; Zfass, A. M.; Makhlouf, G. M. (Medical Coll. Virginia, Richmond, VA). *Clin. Res.* 25(3):309A; 1977.

2889 LIPIDS OF THE ANAL SAC SECRETIONS OF THE RED FOX, Vulpes vulpus, AND OF THE LION Panthera leo. (Eng.) Albone, E. S.; Gronneberg, T. O. (Dept. Animal Husbandry, Univ. Bristol, Langford, Bristol BS18 7DU, England). *J. Lipid Res.* 18(4):474-479; 1977.

2890 TWO MICROSOMAL-ASSOCIATED IRON-BINDING PROTEINS OBSERVED IN RAT SMALL INTESTINAL CELLS DURING IRON ABSORPTION. (Eng.) Kaufman, N.; Wyllie, J. C.; Newkirk, M. (Kingston General Hosp., Kingston, Ontario, Canada). *Biochim. Biophys. Acta* 497(3):719-727; 1977.

2891 EFFECT OF DIETARY PROTEIN WITH AND WITHOUT ADDED DIETARY FIBRE ON FAECAL AMMONIA CONCENTRATIONS AND ON COLONIC FUNCTION [Abstract]. (Eng.) Cummings, J. H.; Branch, W. J.; Houston, H.; Jenkins, D. J. A. (Medical Res. Council, Dunn Nutrition Lab., Cambridge, England). *Gut* 18(5):411-412; 1977.

2892 GLYCOPROTEIN SECRETION AND METABOLISM IN RABBIT ILEUM AFTER EXPOSURE TO CHOLERA AND SHIGELLA ENTEROTOXINS [Abstract]. (Eng.) Kristensen, M.; Kim, Y. S. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5, Part 2):1084; 1977.

See also, 2630, 2633, 2634, 2636, 2639, 2659, 2671, 2710, 2720, 2748, 2765, 2767, 2893, 2894, 2895, 2900, 2901, 2906, 2907, 2908, 2918, 2925, 2927, 3104, 3114, 3137, 3178, 3205, 3218, 3219, 3224, 3350, 3421.

GENERAL

2893 THE INFLUENCE OF GASTRIC SURGERY ON THE INTESTINAL FLORA. (Eng.) Greenlee, H. B.; Gelbart, S. M.; DeOrio, A. J.; Francescatti, D. S.; Paez, J.; Reinhardt, G. F. (Veterans Admin. Hosp., Hines, IL). *Am. J. Clin. Nutr.* 30(11):1826-1833; 1977.

Varying degrees of vagal denervation and gastric resection were performed in dogs analogous to five different peptic ulcer operations commonly performed in patients, to study changes in bacterial flora. Postoperative cultures of the stomach and small bowel were obtained via laparotomy at intervals up

to 1 yr. Quantitative aerobic and anaerobic bacteriological studies demonstrated a persistent and marked increase in the number of microorganisms comprising the flora of the upper small bowel after each of these gastric operations except parietal cell (proximal gastric) vagotomy. In parietal cell vagotomy, antral-duodenal parasympathetic innervation is preserved, and generally no modification of the gastric outlet is necessary unless stenosis is present. The reduction in gastric acidity following parietal cell vagotomy that was observed at the 30- and 90-day postoperative test intervals paralleled the reduction seen after more extensive gastric surgical operations. Attempts to explain the mechanism(s) of bacterial proliferation in the upper small bowel following peptic ulcer surgery must therefore take into account the influence of antral-duodenal vagal innervation as well as the bacteriostatic effects of gastric acid.

2894 THE EFFECT OF "HUMANISED" MILKS AND SUPPLEMENTED BREAST FEEDING ON THE FAECAL FLORA OF INFANTS. (Eng.) Bullen, C. L.; Tearle, P. V.; Stewart, M. G. (Public Health Lab., Luton, England). *J. Med. Microbiol.* 10(4):403-443; 1977.

The microbiological and physicochemical properties of fecal specimens from 47 babies on different diets were studied weekly during the first 6 weeks of life. Thirteen infants received breast milk alone, 9 received Cow and Gate Premium milk, 10 received Scientific Milk Adaptation Gold Cap milk, and 15 received breast milk and in the first week of life a supplement of modified cows' milk. The Cow and Gate Premium milk and the Scientific Milk Adaptation Gold Cap milk formulas were cow's milk preparations with the protein and carbohydrate content adjusted to concentrations similar to those of breast milk and with buffering capacities only slightly greater than that of breast milk. An acetate buffer was demonstrated in the feces of over 60% of breast-fed infants during the first 4 weeks of life. No buffer was demonstrated in the feces of either bottle-fed group over the same period. Only 20% of breast-fed infants receiving a supplement produced an acetate buffer in the first week, but this figure increased to 60% by the fourth week. Breast-fed babies produced feces with a low pH (5.1-5.4), high counts of bifidobacteria, and low counts of coliforms, bacteroids, and clostridia; with the exception of acetic acid, there was a notable absence of most volatile fatty acids from these feces. Infants fed Premium milk produced feces with a high pH (5.9-8.0) and a relatively high bifidobacterial count in the first week; thereafter no bacterial species predominated. A wide variety of volatile fatty acids was present in these infants' feces. Infants fed Gold Cap milk produced feces with a high pH (6.4-8.2) and a wide variety of volatile fatty acids; the counts of coliform bacilli and putrefactive bacteria were high, while bifidobacteria counts were low. Breast-fed infants who received a supplement in the first week produced acid feces, but the pH was higher than that of infants fed breast milk alone; the bacterial flora was putrefactive for the first 2 weeks but gradually became fermentative, and although several volatile fatty acids were detected in the feces in the first week they gradually decreased during the following 5 weeks. The results support earlier findings that the supplementation of breast feeding with artificial feeds of high buffering capacities interferes with the establishment of a fermentative bacterial flora and consequently with the development of acidic feces.

2895 COMPARISON OF THE FECAL MICROFLORA OF SEVENTH-DAY ADVENTISTS WITH INDIVIDUALS CONSUMING A GENERAL DIET: IMPLICATIONS CONCERNING COLONIC CARCINOMA. (Eng.) Goldberg, M. J.; Smith, J. W.; Nichols, R. L. (Univ. Illinois Hosp., Chicago, IL). *Ann. Surg.* 186(1):97-100; 1977.

A double-blind study was carried out in 14 Seventh-Day Adventists, who were vegetarians, and in 14 subjects on a general western diet to determine if there are quantitative or qualitative differences in the fecal microflora of vegetarians. No statistically significant differences were identified in the fecal microflora of the two groups. The bacteriologic analysis included total aerobes and total anaerobes as well as each of the major fecal aerobes and anaerobes. This study seems to indicate that the dietary intake of animal fat and protein does not significantly alter the fecal microflora. It does not, however, invalidate the concept that dietary animal fat does increase bile acid degradation within the gastrointestinal tract, a factor that has been related to colon cancer. Future studies should be directed at identifying the factors that may be present in the gastrointestinal tracts of vegetarians that modify the ability of their colonic microflora to degrade bile acids, an essential step in the production of intraluminal carcinogens or cocarcinogens.

2896 STUDIES ON THE PATHOGENICITY OF Yersinia enterocolitica. I. EXPERIMENTAL INFECTION IN RABBITS. (Eng.) Une, T. (Res. Inst., Daiichi Seiyaku Co., Ltd., 2810, Minamifunabori, Edogawa-ku, Tokyo 132, Japan). *Microbiol. Immunol.* 21(7):349-363; 1977.

The pathogenicity of *Yersinia enterocolitica* was analyzed in a model in which rabbits were inoculated intraduodenally with strains isolated from various sources. Pathogenic strains easily penetrated the epithelial linings of the intestinal mucous membrane into the target reticuloendothelial tissues of the intestine, such as the lamina propria and lymph follicles, where they multiplied within mononuclear cells and produced granuloma. Granuloma, in severe infections, underwent necrobiosis and sometimes progressed to ulceration accompanied by colony formation of the organisms. In mild infections, granulomatous lesions were localized in lymph follicles and never progressed to ulceration. Nonpathogenic strains were rapidly excreted without penetration of epithelial linings. These observations suggest that *Y. enterocolitica* should be within the category of invasion-type enteropathogenic bacteria such as *Shigella* and *Salmonella*.

2897 MICROVASCULAR PRESSURES IN RAT INTESTINAL MUSCLE AND MUCOSAL VILLI. (Eng.) Gore, R. W.; Bohlen, H. G. (Coll. Medicine, Univ. Arizona, Tucson, AZ 85724). *Am. J. Physiol.* 233(6): H685-H693; 1977.

Direct pressures were recorded from single innervated microvessels in intestinal muscle, submucosal surface, and mucosal villi of rats to obtain a more complete, quantitative measure of the normal pressure distributions in these regions. Results were compared with existing data from whole-organ, isogravimetric studies. Pressures were recorded with a servo-null transducer; vessel dimensions, with a video device; and relative blood flows in muscle and mucosal regions, with microparticles. When femoral artery pressure was 100-110 mm Hg, the average pressures in first-, second-, third-, and fifth-order muscle and submucosal arterioles were 44.8 ± 1.6, 44.6 ± 2.9, 32.4 ± 2.6, and 26.6 ± 2.0 mm Hg, resp. Pressures in fourth-, second-, and first-order muscle and submucosal venules were 16.2 ± 0.8, 14.6 ± 0.9, and 10.5 ± 0.6 mm Hg, resp.; muscle capillary pressures averaged 23.8 ± 1.5 mm Hg. Average pressures in distributing arterioles, capillaries, and second-order venules in mucosal villi were 30.6 ± 1.8, 13.8 ± 2.2, and 12.8 ± 1.5 mm Hg, resp. Relative mean blood flows were 30 ± 1% in the muscles and 70 ± 1% in mucosal villi. The results show that significant regional differences in capillary pressures exist between intestinal muscle and mucosal layers. Capillary pressures and relative flows were used to calculate a weighted-average capillary pressure of 16.8 mm Hg for the whole intestine, which compares favorably with results from isogravimetric studies, and implies that regions in the intestine may continuously filter or absorb while the whole organ is in fluid balance. These results resolve an apparent discrepancy between previous isogravimetric and microcirculatory experiments, but raise new questions about regional differences in transcapillary fluid exchange. Also, resistance ratios calculated from the data indicate venular resistances in the intestine are more important than previously thought.

2898 ACUTE DISTAL INTESTINAL OBSTRUCTION IN GNOTOBIOTIC RATS: INTESTINAL MORPHOLOGY AND CELL RENEWAL. (Eng.) Ecknauer, R.; Clarke, R. M.; Meyer, H. (Univ. Texas Health Science Center, Post Box 20036, Houston, TX 77025). *Virchows Arch.* [*Cell Pathol.*] 25(2):151-160; 1977.

Intestinal morphology and cell renewal were examined 72 hr following complete mechanical obstruction of the distal small intestine in gnotobiotic rats. The obstruction was produced by ligation 20 cm proximal to the ileocecal valve. Small intestine morphology and epithelial cell renewal were investigated proximal and distal to the site of obstruction. Proximal to the site of obstruction there were minor changes in villus height, base length, and in villus cell number, a large increase in depth and diameter of the crypts, and an approximately threefold increase in cell renewal. Distal to the site of obstruction there were no differences between the intestines of rats with obstruction and sham-operated controls. The apparent lack of secretion by the goblet cells and the reduced number of intra-epithelial leukocytes suggest that the barrier function of the small intestine is impaired in obstruction.

2899 REACTIVE HYPEREMIA AND OXYGEN EXTRACTION IN THE FELINE SMALL INTESTINE. (Eng.) Mortillaro, N. A.; Granger, H. J. (Coll. Medicine, Univ. South Alabama, Mobile, AL 36688). *Circ. Res.* 41(6):859-865; 1977.

Experiments were carried out to determine (a) if vasoregulation during vascular occlusion reflects a myogenic or metabolic mechanism, (b) the mechanisms used by intestinal tissue to reestablish normal blood-tissue O_2 transport following the release of vascular occlusion, and (c) the effect of vascular occlusion on intestinal aerobic metabolism. Arterial flow and oxygen extraction were continuously measured from an *in situ*, denervated loop of cat ileum. Following release of arterial occlusion of varying time periods, oxygen extraction decreased transiently, returning to control levels as the hyperemia subsided. These results suggest that the hyperemia overcompensates in attempting to repay the oxygen deficit and, consequently, oxygen extraction is depressed. In the pump-perfused preparation (constant flow), oxygen extraction rose following the release of arterial occlusion, indicating a shift to oxygen extraction as the mechanism for repaying the oxygen deficit in the absence of hyperemia. Following venous occlusion, reactive hyperemia failed to develop in most cats and, when present, was highly blunted. In addition, oxygen extraction rose transiently suggesting that, as with constant flow, this is the mechanism of oxygen debt repayment in the absence of hyperemia. With venous pressure elevation, a decrease in blood flow was coupled to an increase in oxygen extraction that resulted in an overall increase in calculated oxygen consumption; oxygen extraction progressively increased for each level of venous pressure. Estimated oxygen consumption following occlusion suggests a decrease in oxygen demand during arterial occlusion and an increased demand during venous occlusion. However, during venous occlusion, the myogenic and metabolic control mechanisms would elicit opposite effects. The blunted hyperemic response observed following venous occlusion may result from the net influence of both mechanisms acting in opposition, that is, a myogenic influence modulated by a metabolic one.

2900 EFFECTS OF ARGININE VASOPRESSIN ON CAPILLARY FILTRATION IN THE CAT ILEUM. (Eng.) Quillen, E. W.; Granger, D. N.; Taylor, A. E. (Dept. Physiology and Biophysics, Univ. Mississippi Sch. Medicine, Jackson, MS). *Gastroenterology* 73(6): 1290-1295; 1977.

The effect of local intra-arterial infusion of arginine vasopressin on capillary, interstitial, and lymphatic dynamics of the small intestine was studied

in a vascularly perfused segment of cat ileum. Systemic arterial pressure, superior mesenteric arterial pressure, superior mesenteric venous pressure, blood flow, and intestinal volume were continuously monitored. Intestinal lymph flow, lymphatic protein clearance, isovolumetric capillary pressure, capillary filtration coefficient, and vascular resistances were also determined. A dose-response relation was obtained for several parameters, and a dosage of 17.5 mU/kg/min was chosen for more extensive study. At this level, vasopressin increased both systemic and local arterial pressures (from 162 mm Hg and 142 mm Hg, resp., for control levels to 172 mm Hg and 162 mm Hg, resp., while it decreased superior mesenteric venous pressure, capillary pressure, and blood flow. Precapillary, postcapillary, and total vascular resistance were all increased during the vasopressin infusion; however, a greater effect was demonstrated on the precapillary vessels as indicated by an increased pre- to postcapillary resistance ratio. Vasopressin infusion also reduced the capillary filtration coefficient, intestinal volume, lymph flow, and lymphatic protein clearance. The results establish an effect of vasopressin on transcapillary and lymphatic volume flows in the small intestine.

2901 SOME FACTORS INFLUENCING CAECAL ENLARGEMENT INDUCED BY RAW POTATO STARCH IN THE RAT. (Eng.) El-Harith, E. A.; Walker, R.; Birch, G. G.; Sukan, G. (Dept. Biochemistry, Univ. Surrey, Guildford, Surrey GU2 5XH, England). *Food Chem.* 2(4):279-289; 1977.

The phenomenon of cecal enlargement in rats fed raw potato starch as their sole dietary carbohydrate source was examined. The ceca of animals fed a diet containing 71% raw potato starch (total carbohydrate content) were enlarged 800-1,700%. They contained undigested starch, an increased number of microorganisms, and a lower concentration of ions and were of lower pH (5.5) than those of controls (pH 7.0) fed raw maize starch, extracted maize starch, or extracted potato starch. The duodenal contents had a lower specific activity of amylase expressed either as whole duodenal contents or on the basis of duodenal protein, which was also depressed. This finding suggests that the potato starch either: (a) contains an inhibitor of pancreatic amylase, (b) lacks an amylase activating or stabilizing factor, or (c) causes changes in the duodenal secretions. The resistance of potato starch to pancreatic amylase, together with the lower level of amylase in the duodenum, results in undigested starch reaching the cecum, and probably acting as a substrate there for the cecal microflora. Cecal enlargement may result from a homeostatic, adaptive mechanism to control water absorption and osmolality in the cecum.

2902 VASCULAR RESPONSES TO MECHANICAL STIMULATION OF THE MUCOSA OF THE CAT COLON. (Eng.) Fasth, S.; Hulten, L.; Lundgren, O.; Nordgren, S. (Dept. Surgery II, Univ. Goteborg, Goteborg, Sweden). *Acta Physiol. Scand.* 101(1):98-104; 1977.

Studies were carried out in cats to determine whether a local vasodilator response similar to that in the small intestine could be elicited by mechanical stimulation of the colonic mucosa and to study the role of 5-hydroxytryptamine (5-HT) in the reflex vasodilatation associated with mechanical stimulation of the rectal mucosa. Mechanical stimulation of the mucosa of the proximal colon (by rotating a swab in the colonic lumen at laparotomy) evoked a hyperemia that also could be elicited by severing the autonomic fibers to the colon. Mechanical stimulation of the distal colon produced a hyperemia that was abolished by cutting the pelvic nerves. Afferent pelvic nerve stimulation evoked a response similar to that seen when stimulating the distal colon. Adrenergic and cholinergic receptor blocking agents did not affect the responses. Dihydroergotamine, given in doses that abolished the vascular effects of intra-arterial 5-HT, abolished the hyperemia that occurred following mechanical stimulation of the proximal colon but not that of the distal stimulation. It is concluded that a local nervous vasodilator reflex exists in the proximal colon similar to that which has been previously demonstrated in the small bowel and that the reflex vasodilatation evoked by mechanical stimulation in the distal colon is mediated via the pelvic nerves.

2903 COLONIC BASOPHIL HYPERSENSITIVITY. (Eng.) Askenase, P. W.; Boone, W. T.; Binder, H. J. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *J. Immunol.* 120(1):198-201; 1978.

Contact hypersensitivity reactions were elicited by intraluminal application of dinitrochlorobenzene (DNCB, 500 mg of a 2.5% solution) to the colon of guinea pigs. Some of the resulting lesions contained large infiltrates of basophils. These colonic basophil hypersensitivity reactions were accompanied by systemic sensitization and were not seen in nonspecific colonic inflammatory responses induced by croton oil. The heterogenous immune inflammatory responses induced in the colon by DNCB contact sensitivity may serve as a model for the study of inflammatory bowel disease.

2904 CLINDAMYCIN-ASSOCIATED COLITIS DUE TO A TOXIN-PRODUCING SPECIES OF Clostridium IN HAMSTERS. (Eng.) Bartlett, J. G.; Onderdonk, A. B.; Cisneros, R. L.; Kasper, D. L. (Veterans Admin. Hosp., Boston, MA 02130). *J. Infect. Dis.* 136(5):701-705; 1977.

Clindamycin-associated enterocolitis was studied in hamsters to determine whether there is a transmissible agent involved in this entity. The disease could be transferred by cecal contents and filtrates of cecal contents (pore size of filter, 0.02 μm) obtained from animals after the i.m. administration of clindamycin (6 mg/day). Subsequent work showed that enterocolitis could be produced with broth cultures of a species of *Clostridium* recovered from cecal contents of animals with clindamycin-induced disease. The cell-free supernatant of this strain

also caused enterocolitis. Cecal contents from animals with clindamycin-induced disease incubated with gas gangrene antitoxin failed to cause intestinal lesions. These experiments indicate that clindamycin-associated colitis in hamsters is due to a clindamycin-resistant, toxin-producing strain of *Clostridium*.

2905 GASTROINTESTINAL AND SYSTEMIC TOXICITY OF FECAL EXTRACTS FROM HAMSTERS WITH CLINDAMYCIN-INDUCED COLITIS. (Eng.) Rifkin, G. D.; Silva, J., Jr.; Fekety, R. (Dept. Internal Medicine, Univ. Michigan, Ann Arbor, MI). *Gastroenterology* 74(1): 52-57; 1978.

The feces of clindamycin-treated hamsters were examined for the presence of toxic substances. Clindamycin (100 mg/kg) induced enterocolitis. Suspensions derived from cecal contents of clindamycin-treated animals induced a hemorrhagic ileocecitis and death within 2 to 4 days after being given orogastrically to other hamsters. The i.p. injection of sterile filtrates of these suspensions produced an exudative peritonitis, intra-abdominal hemorrhages, and death of 80-100% of hamsters within 1 day. These effects were not seen with the i.p. injection of clindamycin or endotoxin, only small amounts of which were present in the filtrate. Incubation of the filtrate *in vitro* with polyvalent clostridial antitoxin neutralized its toxicity. *In vitro* incubation of the filtrate with normal equine serum did not reduce its *in vivo* toxicity. The toxic substance(s) contained in the filtrate was heat-labile and produced morphological changes in Y-1 adrenal cell cultures characteristic of heat-labile enterotoxins. Cecal filtrates obtained from saline-treated animals produced none of these effects. These preliminary studies suggest that enterotoxin-like substances, possibly produced by clostridia, may play an important role in the pathogenesis of clindamycin-induced colitis in the hamster.

2906 EXPERIMENTAL HAMSTER ENTERITIS: AN ELECTRON MICROSCOPIC STUDY. (Eng.) Frisk, C. S.; Wagner, J. E. (Unit Comparative Medicine, Univ. Minnesota, Minneapolis, MN). *Am. J. Vet. Res.* 38 (11):1861-1868; 1977.

In an attempt to clarify the relationship of an intracellular organism that has been identified within the ileal epithelial cells in animals with hamster enteritis (HE) to the pathogenesis of HE, electron microscopic studies of absorptive epithelial cells were carried out in normal hamsters, hamsters with naturally occurring HE, and in hamsters with experimentally induced HE. HE was experimentally produced in weanling hamsters by the p.o. inoculation of healthy hamsters with suspensions of ilea obtained from hamsters with HE. Control groups of hamsters were inoculated p.o. with suspensions of ilea from healthy hamsters. Ilea from 6 control hamsters, 31 hamsters with experimentally produced HE, and 4 hamsters with naturally occurring HE were studied. Ultrastructural changes were not observed in the absorptive epithelium of control animals. Two different intracytoplasmic bacterial organisms were observed in epithelial cells of hamsters with experimentally produced HE. Organisms that were observed early in the disease process were identified as *Escherichia coli*. Organisms ultrastructurally similar to *Campylobacter* species were observed later in the disease and were only within hyperplastic epithelial cells. The hyperplastic ileal epithelium of hamsters with naturally occurring HE contained campylobacter-like organisms. The results suggest that a synergism between two bacterial organisms may be responsible for the lesions of HE: an enteropathogenic, cell-invasive *E. coli* causing acute enteritis, and small organisms (possibly *Campylobacter* species), which are responsible for the marked ileal cell hyperplasia of HE.

2907 IMMUNOHISTOCHEMISTRY OF CARCINOEMBRYONIC ANTIGEN: CHARACTERIZATION OF CROSS-REACTIONS WITH OTHER GLYCOPROTEINS. (Eng.) Isaacson, P.; Judd, M. A. (General Hosp., Southampton, England). *Gut* 18(10):779-785; 1977.

In the course of demonstrating carcinoembryonic antigen (CEA) in normal human small intestine, cross-reactivity of specific antiserum against RBC, vascular endothelium, and Paneth cell granules was noted. Pretreatment of sections with periodic acid eliminated these cross-reactions without affecting the staining of CEA, indicating that the antigenic determinants shared between CEA and other glycoproteins are in the carbohydrate portion of the molecules. These findings emphasize that immunohistochemical results should be regarded with caution, even when they are apparently well controlled.

2908 THE INTERACTION OF DIETARY FIBERS AND CHOLESTEROL UPON THE PLASMA LIPIDS AND LIPOPROTEINS, STEROL BALANCE, AND BOWEL FUNCTION IN HUMAN SUBJECTS. (Eng.) Raymond, T. L.; Connor, W. E.; Lin, D. S.; Warner, S.; Fry, M. M.; Connor, S. L. (Univ. Oregon Health Sciences Center, Portland, OR 97201). *J. Clin. Invest.* 60(6):1429-1437; 1977.

To identify any metabolic effects of dietary fiber upon cholesterol metabolism in man, six adult volunteer subjects were given eucaloric cholesterol-free formula diets, with and without added dietary fiber, for two 4-week periods. Dietary fiber consisted of 60 g of plant cell wall material (or 16 g of crude fiber) derived from corn, beans, bran, pectin, and purified cellulose. This provided about five times the fiber intake of the typical American diet. The addition of fiber to the cholesterol-free diet did not change either the plasma cholesterol level (171 ± 21 to 167 ± 18 mg/dl) or the triglyceride level (103 ± 39 to 93 ± 27 mg/dl). The excretion of both endogenous neutral steroids and bile acids were unchanged with fiber (505 ± 41 to 636 ± 75 mg/day and 194 ± 23 to 266 ± 47 mg/day, resp.). However, total fecal steroid excretion was increased (699 ± 29 to 902 ± 64 mg/day, $p<0.025$). With fiber, intestinal transit time was decreased

(59 ± 9 to 35 ± 8 hr, $p<0.005$), and both the wet and dry stool weights were greatly increased. A second group of six subjects received similar diets containing 1,000 mg cholesterol derived from egg yolk. The addition of fiber to the 1,000-mg cholesterol diet did not alter either plasma cholesterol level (233 ± 26 to 223 ± 36 mg/dl) or triglyceride level (102 ± 19 to 83 ± 11 mg/dl). The excretion of endogenous neutral steroids (618 ± 84 to 571 ± 59 mg/day), of bile acids (423 ± 122 to 401 ± 89 mg/day), and of total fecal steroids (1,041 ± 175 to 972 ± 111 mg/day) were unchanged by fiber. The absorption of dietary cholesterol was not altered when fiber was added to the 1,000-mg cholesterol diet (44.0 ± 3.3 to 42.9 ± 2.5%). A two-way analysis of variance utilizing both groups of subjects indicated a significant ($p<0.001$) effect of dietary cholesterol upon the plasma cholesterol concentration. A large quantity of dietary fiber from diverse sources has little or no effect upon the plasma lipids and sterol balance in man, in spite of the fact that intestinal transit time and stool bulk changed greatly.

2909 REMOVAL OF GASTRIN BY VARIOUS ORGANS IN DOGS. (Eng.) Strunz, U. T.; Walsh, J. H.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Bldg. 115, Rm. 115, Los Angeles, CA 90073). *Gastroenterology* 74(1):32-33; 1978.

The role of various organs in gastrin metabolism was studied in dogs. In six anesthetized dogs receiving 400 pmol/kg/hr of natural human little gastrin i.v., blood samples for radioimmunoassay of gastrin were taken repeatedly from a carotid artery, jugular vein, femoral vein, renal vein, and mesenteric vein. The calculated removal of gastrin in a single passage through these four vascular beds ranged from 21% to 30% and did not differ significantly among them. In six additional dogs, the carotid arterial to hepatic venous removal was 40%. It is concluded that the percentage removal of gastrin is about the same in all of the major vascular beds of the body.

2910 GASTROINTESTINAL EPITHELIAL RENEWAL. (Eng.) Eastwood, G. L. (West Roxbury Veterans Admin. Hosp., Boston, MA 02132). *Gastroenterology* 72(5, Part 2):962-975; 1977.

2911 EFFECT OF CHRONIC ALCOHOL INTAKE ON AMINO ACIDS [Abstract]. (Eng.) Stanko, R. T.; Morse, E. L.; Adibi, S. A. (Montefiore Hosp., Pittsburgh, PA). *Gastroenterology* 72(5, Part 2): 1136; 1977.

2912 ANTIGEN FEEDING ALTERS THE IMMUNE RESPONSES OF ANTIGEN SENSITIVE CELLS IN EXTRAINTESTINAL SITES [Abstract]. (Eng.) Kagnoff, M. F. (Univ. California, La Jolla, CA 92093). *Gastroenterology* 72(5, Part 2):1076; 1977.

2913 PRIMING OF CYTOTOXIC T CELLS BY ANTIGEN FEEDING [Abstract]. (Eng.) Kagnoff, M. F.; (Univ. California, La Jolla, CA 92093). *Gastroenterology* 72(5, Part 2):1076; 1977.

2914 AGE DEPENDENCE IN FASTING PLASMA MOTILIN: ELEVATION IN INFANTS [Abstract]. (Eng.) Mitznegg, P.; Domschke, W.; Schubert, E.; Domschke, S.; Sprugel, W.; Wunsch, E.; Demling, L. (Dept. Pharmacology, Univ. Erlangen-Nurnberg, Nurnberg, W. Germany). *Gastroenterology* 72(5, Part 2):1103; 1977.

2915 USE OF SYNTHETIC NON-SULFATED CCK-PZ AND VARIANT 39-CCK-PZ IN RADIOIMMUNOASSAY (RIA) [Abstract]. (Eng.) del Mazo, J. (Veterans Admin. Hosp., Atlanta, GA). *Gastroenterology* 72(5, Part 2):1047; 1977.

2916 ASCITES FORMATION AND REABSORPTION: A STUDY OF FLUID AND PROTEIN EXCHANGE IN PERITONEAL CAVITY OF ANESTHETIZED CATS [Abstract]. (Eng.) Zink, J. R. (Univ. Manitoba, Manitoba, Canada). *Dise. Abstr. Int.* [*B*] 38(2):537B-538B; 1977.

2917 INTESTINAL PATHOPHYSIOLOGY ASSOCIATED WITH REJECTION OF AN ENTERIC PARASITE IN IMMUNIZED AND NONIMMUNIZED HOSTS [Abstract]. (Eng.) Russell, D.; Castro, G. A. (Univ. Texas Medical Sch., Houston, TX). *Gastroenterology* 72(5, Part 2): 1123; 1977.

2918 "R"-LIVING VACCINE AGAINST COLIBACILLOSIS: COMMUNICATION I. (Eng.) Parnas, J.; Dam, A.; Jorgensen, J. B. (State Veterinary Serum Lab., Copenhagen, Denmark). *Zentralbl. Bakteriol. Hyg.* 237(4):494-503; 1977.

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2922 USE OF ARGON LASER IN THE TREATMENT OF UPPER G-I BLEEDING IN PRIMATES [Abstract]. (Eng.) Butler, M. L. (Letterman Army Medical Center, San Francisco, CA). *Gastroenterology* 72(5, part 2):1155; 1977.

2923 BLOOD FLOW AND OXYGEN CONSUMPTION IN THE FELINE SMALL INTESTINE; RESPONSES TO ARTIFICIAL DISTENSION AND INTESTINAL OBSTRUCTION. (Eng.) Ohman, U. (Karolinska Sjukhuset, Stockholm, Sweden). *Acta Chir. Scand.* 142(4):329-333; 1976.

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2931 IMMUNOCHEMICAL DISTINCTION BETWEEN RAT GASTRIN AND OTHER MAMMALIAN GASTRINS [Abstract]. (Eng.) Holmquist, A. L.; Walsh, J. H.; Feldman, E. J. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1071; 1977.

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2938 Fasciola hepatica: BILE DUCT ENLARGEMENT INDUCED IN RATS AFTER INTRAPERITONEAL TRANSPLANTATION. (Eng.) Isseroff, H.; Girard, P. R.; Leve, M. D. (Dept. Biology, State Univ. Coll., Buffalo, NY 14222). *Exp. Parasitol.* 41(2):405-409; 1977.

2939 PHYTOHAEMAGGLUTININ (PHA) LYMPHOCYTE TRANSFORMATION: INCREASED SPLEEN SUPPRES-

SOR CELL ACTIVITY AND SPLENIC PRODUCTION OF SERUM INHIBITORY FACTORS IN A RAT EXPERIMENTAL CIRRHOSIS MODEL [Abstract]. (Eng.) MacSween, R. N. M.; Singer, C. R. J.; Folch, H.; Thomas, H. C. (Western Infirmary, Glasgow, Scotland). *Digestion* 14(5/6): 532; 1976.

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2944 INTRAVENOUS (IV) VS. INTRA-ARTERIAL (IA) VASOPRESSIN AND PRIMATE MESENTERIC BLOOD FLOW [Abstract]. (Eng.) Kerr, J. C.; Freedman, A. R.; Swan, K. G. (New Jersey Medical Sch., Newark, NJ). *Gastroenterology* 72(5, Part 2):1079; 1977.

2945 EXPERIMENTAL HEPATIC ENCEPHALOPATHY. I. CHANGES IN THE PATTERN OF SLEEP FOLLOWING PORTACAVAL SHUNT IN THE RAT. (Fre.) Monmaur, P.; Beaubernard, C.; Salomon, F.; Grange, D.; Thangapregassam, M. J.; Bismuth, H. (INSERM U-17, Hopital Paul-Brousse, 14, avenue P.-V-Couturier, F 94800 Villejuif, France). *Biol. Gastroenterol. (Paris)* 9(2):99-103; 1976.

2946 EXPERIMENTAL HEPATIC ENCEPHALOPATHY. II. STUDY OF THE RESPONSE TO NOCICEPTIVE STIMULI IN THE RAT FOLLOWING PORTACAVAL SHUNT. (Fre.) Salomon, F.; Beaubernard, C.; Thangapregassam, M. J.; Grange, D.; Bismuth, H. (INSERM U-17, Hopital Paul-Brousse, 14, avenue P.-V-Couturier, F 94800 Villejuif, France). *Biol. Gastroenterol. (Paris)* 9(2):105-108; 1976.

2947 A NEW TECHNIQUE OF EN BLOC LIVER-PANCREAS TRANSPLANTATION [Abstract]. (Eng.) Bitter-Suermann, H.; Brynger, H.; Wickstrom, J.; Gabel, H.; Save-Soderbergh, J. (McGill Univ. Cancer Res. Unit, 3655 Drummond St., Montreal, Quebec H3G 1Y6, Canada). *Eur. Surg. Res.* 9(Suppl. 1):104; 1977.

2948 MANNOSIDOSIS--PATHOGENESIS OF LESIONS IN EXOCRINE CELLS. (Eng.) Jolly, R. D.; Thompson, K. G. (Faculty Veterinary Science, Massey Univ., Palmerston North, New Zealand). *J. Pathol.* 121(1):59-62; 1977.

See also, 2785, 2792, 2816, 2839, 2883, 3133, 3268, 3336.

DIAGNOSTIC PROCEDURES

2949 DETERMINATION OF $^{14}CO_2$ IN BREATH AND ^{14}C IN STOOL AFTER ORAL ADMINISTRATION OF CHOLYL-1-[^{14}C]GLYCINE: CLINICAL APPLICATION. (Eng.) Roda, A.; Roda, E.; Aldini, R.; Mazzella, G.; Festi, D.; Sama, C.; *et al.* (Univ. Bologna, Inst. Chemistry G. Ciamician, 40100 Bologna, Italy). *Clin. Chem.* 23(11):2127-2132; 1977.

A $^{14}CO_2$ breath test for bile acid deconjugation was developed, and the method was validated in 20 patients with intestinal bacterial overgrowth and 20 controls. $^{14}CO_2$ is measured in the breath after cholyl-1-[^{14}C]glycine administration (5 µCi, 100 g/l ethanolic solution, 5 ml, p.o.). The mean $^{14}CO_2$ output/24 hr was 11.0 ± 5.2% in controls and 54.2 ± 14.0% in bacterial overgrowth patients ($p<0.001$). The $^{14}CO_2$ excretion rate in 12 hr, when normalized to 100% of the dose at the 12th hr, gave an even finer discrimination between the two groups (no false responses). ^{14}C in stool, analyzed in 20 malabsorption patients and 20 controls by two different techniques, was 6.6 ± 4% and 31.38 ± 21.7%, resp. Bile acid malabsorption was in reasonable agreement ($r=0.67$) with percentage of "chenoid" (chenodeoxycholic acid plus ursodeoxycholic acid) in the stool by gas-liquid chromatography; a poorer correlation was observed when "chenoid" plus "choloid" (cholic acid plus its epimers) were plotted versus ^{14}C in stool ($r=0.57$, $n=15$).

2950 INTESTINAL ACTIVITIES OF TRYPSIN, LIPASE, AND PHOSPHOLIPASE AFTER A TEST MEAL: AN EVALUATION OF 474 EXAMINATIONS. (Eng.) Ihse, I.; Arnesjo, B.; Kugelberg, C.; Lilja, P. (Dept. Surgery, Univ. Lund, S-221 85 Lund, Sweden). *Scand. J. Gastroenterol.* 12(6):662-668; 1977.

The value of indirect stimulation of the pancreas by a test meal as a routine pancreatic function test was investigated by comparing trypsin, lipase, and phospholipase concentrations in intestinal aspirates from 452 patients. Trypsin was determined in 452 subjects, lipase in 117, and phospholipase in 57. Following meal stimulation, trypsin levels were subnormal (<37 U/ml) in 88% of the 74 patients with chronic pancreatic diseases; the lipase activity was subnormal (<185 U/ml) in 80% of those with pancreatic disease, while the phospholipase activity was low in 81% of patients with chronic pancreatic disease. The outcome of repeated trypsin tests was completely consistent in 20 of 22 patients. Calculations of ratios between the enzymes studied suggested that lipase was the enzyme most susceptible to pancreatic damage. In 29 cases of celiac disease and in 18 cases in which Polya gastric resection had been performed, the decrease of the intestinal lipase concentrations was more marked than that of the other enzymes. In 9% of the cases of chronic pancreatic insufficiency, the diagnosis would have been overlooked if either lipase or trypsin had been the only enzyme determined. Enzyme determination following meal stimulation is reliable, simple, physiological, and inexpensive, and it is recommended as a routine test of the pancreatic function.

2951 TECHNIQUE FOR MICRODISSECTION AND MEASUREMENT IN BIOPSIES OF HUMAN SMALL INTESTINE. (Eng.) Ferguson, A.; Sutherland, A.; MacDonald, T. T.; Allan, F. (Gastrointestinal Unit, Univ. Edinburgh, Edinburgh EH4 2XU, Scotland). *J. Clin. Pathol.* 30(11):1068-1073; 1977.

A microdissection and measurement technique adapted for biopsy of human small intestine is described. The technique was applied to the measurement of villi, crypts, and crypt mitotic counts in 90 specimens of normal small intestinal tissue. Specimens fixed in alcohol and acetic acid are Schiff stained in bulk. Villi and crypts are then dissected out under a dissecting microscope, placed under a coverslip, examined, measured, and the number of mitoses in individual crypts counted. With this method, specimens of normal small intestine were found to have villi 500 µm to 1,100 µm long and crypts 150 µm to 300 µm. These values were double those obtained when measuring sections of the same specimens stained with hematoxylin and eosin. The mean number of mitoses per crypt in normal duodenum and jejunum ranged from 1 to 12, and most of the cells in mitosis were in prophase or telophase. This rapid, sensitive, and inexpensive technique complements the available methods of measuring small intestinal architecture.

2952 A NEW HISTOCHEMICAL TECHNIQUE OF USE IN THE INTERPRETATION AND DIAGNOSIS OF ADENOCARCINOMA AND VILLOUS LESIONS IN THE LARGE INTESTINE. (Eng.) Culling, C. F. A.; Reid, P. E.; Worth, A. J.; Dunn, W. L. (Dept. Pathology, Univ. British Columbia, Vancouver, British Columbia, Canada). *J. Clin. Pathol.* 30(11):1056-1062; 1977.

The periodic acid-thionin Schiff/potassium hydroxide/periodic acid-Schiff (PAT/KOH/PAS) procedure was used to investigate the histochemical staining characteristics of the mucins found in adenocarcinoma and villous lesions of the large intestine. The 46 blocks examined represented 58 lesions from 37 patients, all of whom had had resections for carcinoma of the colon. In contrast to normal colon, none of the adenocarcinomas stained red with the PAT/KOH/PAS. With two exceptions, the poorly and moderately differentiated adenocarcinomas stained blue, whereas of the well differentiated lesions half were blue and half purple. The malignant villous lesions demonstrated the same trends, although a larger percentage were purple. None of the benign lesions stained blue. Malignancy in the colon is accompanied by an increase in blue staining in the PAT/KOH/PAS technique, and such staining may be of value in the interpretation of highly atypical adenoma where it might identify the onset of malignancy. This change in staining indicates a distinct alteration in the chemistry of the mucins, which are interpreted to be a reduction in the degree of side chain O-acylation of their constituent sialic acids.

2953 PHENOTYPIC MARKERS IN HUMAN SKIN FIBROBLASTS AS POSSIBLE DIAGNOSTIC INDICES

OF HEREDITARY ADENOMATOSIS OF THE COLON AND RECTUM. (Eng.) Kopelovich, L. (Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY 10021). *Cancer* 40(5, Suppl.):2534-2541; 1977.

The growth abnormalities of cultured human skin fibroblasts derived from normal-appearing cutaneous biopsies from subjects with hereditary adenomatosis of the colon and rectum (ACR) genotypes and from a portion of their clinically asymptomatic ACR progeny (first filial generation) are described together with the differential susceptibility of these fibroblasts to transformation by Kirsten murine sarcoma virus. These skin fibroblasts, but not cells derived from unaffected individuals, showed lack of contact inhibition, decreased serum requirement for growth, elevated levels of plasminogen activator (46.7 ± 6.5%), and alterations in the intracellular distribution of actin cables; they did not, however, grow in the absence of anchorage, nor did they form palpable tumors in congenitally athymic BALB/c *nu/nu* mice, and they were normal with regard to cholesterol feedback regulation. Skin fibroblasts from ACR subjects were 100- to 1,000-fold more susceptible to transformation by the Kirsten murine sarcoma virus than were normal cells. The virally transformed skin fibroblasts were anchorage-independent and formed tumors in athymic mice. These growth abnormalities represent steps in the changing phenotypic expression of cells undergoing neoplastic transformation. Identification of abnormal expresions associated with oncogenesis may facilitate their use as diagnostic indices for the detection of latent forms of colon cancer in man.

2954 COLORECTAL CANCER DIAGNOSIS BY A DIRECT LEUKOCYTE MIGRATION TEST USING A PANEL OF TUMOUR EXTRACTS. (Eng.) Zoller, M.; Matzku, S.; Schulz, U. (German Cancer Res. Center, Heidelberg, W. Germany). *Cancer Immunol. Immunother.* 2(4):257-265; 1977.

Experiments were carried out to determine if the modified direct leukocyte migration test, using a panel of tumor extracts, is as useful in the detection of colorectal cancer as of gastric cancer and to study the results of this test after surgery and when metastases occurred. Peripheral WBC were pulsed with a high dose (2.5 and 0.5 mg/ml) of 3 M KCl extracts from five different colorectal tumors as well as with one 3 M KCl extract of normal colonic mucosa. Patients showing a pathological migration index (≤0.80 and ≥1.17) with three or more of the five tumor extracts were considered as "positives." With this test, 55/59 of patients with colorectal carcinomas were reactive, irrespective of the tumor stage, while only 2/27 patients with nonmalignant colorectal diseases showed a positive reaction. Patients with malignant and nonmalignant diseases of other organs were reactive in 2-3% of cases. No positive reactivity was observed with WBC from 37 healthy volunteers. When WBC were pulsed with the normal colonic mucosal extract, a pathological migration index was found in about 20% of colorectal cancer patients, but not in healthy volunteers. Evaluating 10 single-tumor extracts individually, the reactivity of cancer patients' WBC ranged from 65-89% of tests, but this difference was not statistically significant. WBC from healthy volunteers showed a pathological migration index with the different extracts in 0-6% of tests. With the leukocyte migration test, tumors of the colon, sigmoid, or rectum could not be distinguished. Patients bearing tumors in any part of the large bowel showed pathological leukocyte migration with extracts of colon, sigmoid, and rectal tumors. When the cross-reactivity study was extended to tumors of the gastrointestinal tract, it was found that patients with colorectal tumors were reactive, in a high percentage of tests, with extracts of gastric tumors, but gastric as well as esophageal and pancreatic cancer patients' WBC only reacted occasionally with colorectal tumor extracts. In the follow-up study, a positive reactivity was still found 10-14 days after surgery in 27 of 31 patients. After more than 2 months, the frequency of positive reactivity decreased to 10 of 70 cases. Patients with local recurrence or metastases exhibited positive reactivity in six of seven cases. The panel modification of the leukocyte migration test is highly sensitive and specific in the study of colorectal tumors, and it may be valuable in follow-up studies after colorectal tumor excision.

2955 THE DISTRIBUTION OF GASTRIC ULCERS: DOUBLE CONTRAST BARIUM MEAL AND ENDOSCOPY FINDINGS. (Eng.) Stevenson, G. (McMaster Univ. Medical Center, 1200 Main St. West, Hamilton, Ontario, Canada). *Clin. Radiol.* 28(6):617-624; 1977.

To evaluate conflicting findings in the radiologic and endoscopic diagnosis of ulcers in various areas of the stomach, 1,000 consecutive double-contrast barium meals and 424 consecutive upper gastrointestinal endoscopic examinations were reviewed. Seventy gastric ulcers were found radiologically in 56 patients, and 82 gastric ulcers were found endoscopically in 70 patients. Fifty-five percent of radiologically and 53.6% of endoscopically diagnosed ulcers were located in the mid or upper body of the stomach. This distribution is contrary to previous radiological findings with the traditional barium meal. Age did not seem to be a major factor. The double-contrast meal and, in particular, the left anterior oblique view with the head elevated, display *en face* the lesser curve of the upper body around the cardia where many benign ulcers and carcinomas arise.

2956 LIVER BIOPSY: COMPLICATIONS IN 1000 INPATIENTS AND OUTPATIENTS. (Eng.) Perrault, J.; McGill, D. B.; Ott, B. J.; Taylor, W. F. (Mayo Clinic, 200 First St. SW, Rochester, MN 55901). *Gastroenterology* 74(1):103-106; 1978.

Risk factors were evaluated prospectively in 829 outpatients and 171 inpatients who underwent liver biopsy. The two groups were similar, except that the outpatient group had a higher percentage of patients with hepatitis-cirrhosis and a lower percentage with neoplasia when compared with the inpatient group ($p<0.01$). The inpatient group had

more relative contraindications ($p<0.01$). Among the total 1,000 patients, none died and none required laparotomy. If moderate to severe pain, hypotension, or both developed (5.9%), they first became manifest during a 3-hr period of observation after biopsy. Forty-four outpatients (5.3%) were hospitalized; 39 were dismissed within 36 hr and 5 within 4 days. Complications were more often experienced by those with relative contraindications ($p<0.05$) and increased number of passes ($p<0.01$). Inpatients with hepatitis-cirrhosis experienced more complications ($p<0.05$) than did patients with other diagnoses (12.8% versus 3.8%). Complications were not related to type of needle, site of entry, or experience of operator. Liver biopsy as an outpatient procedure is safe if facilities are available for 3 hr of observation and hospital support; 5% of patients will require immediate hospitalization.

2957 CLINICAL INDICATIONS AND ACCURACY OF GRAY SCALE ULTRASONOGRAPHY IN THE PATIENT WITH SUSPECTED BILIARY TRACT DISEASE. (Eng.) Prian, G. W.; Norton, L. W.; Eule, J., Jr.; Eiseman, B. (Univ. Colorado Medical Center, Denver, CO). *Am. J. Surg.* 134(12):705-711; 1977.

The clinical efficacy of gray scale, B-mode ultrasonography was evaluated in patients with suspected biliary tract disease. One hundred patients underwent gray scale cholecystosonography (GSCS) and had diagnostic confirmation by p.o. cholecystogram (OCG) and/or operation. Ultrasonography demonstrated the gallbladder in 94 of the 100 patients; 2 patients had had previous cholecystectomy, and 3 of the 4 remaining patients had documented stones with no confirmation of a nonvisualizing OCG in the other patient. Among the 88 patients with OCG, GSCS findings correlated in 91% (2% false-positive; 7% false-negative). Among the 43 operative patients, GSCS was proven correct in 91% (no false positive; 9% false-negative). Of 12 patients with jaundice, GSCS correlated with operative findings in 75% (no false-positive; 25% false-negative). Diagnostic errors occurred in patients with very small biliary calculi, particularly when a single stone was impacted in the cystic duct. Failure to identify the gallbladder with ultrasound signifies probable cholelithiasis in the patient without previous cholecystectomy. It is concluded that: (a) GSCS is most useful when jaundice or acute illness precludes conventional studies; (2) GSCS provides an inexpensive, quick, accurate means of diagnosing cholelithiasis with a very high specificity (97%) and moderate sensitivity (88%); and (c) GSCS is the optimal diagnostic procedure for evaluating the biliary tract in the acutely ill, jaundiced, vomiting, allergic, and/or pregnant patient.

2958 GRAY SCALE ULTRASONOGRAPHY OF THE GALLBLADDER: AN EVALUATION OF ACCURACY AND REPORT OF ADDITIONAL ULTRASOUND SIGNS. (Eng.) Anderson, J. C.; Harned, R. K. (Univ. Nebraska Medical Center, 42nd and Dewey Ave., Omaha, NB 68105). *Am. J. Roentgenol.* 129(6):975-977; 1977.

The results of ultrasound examinations of 76 patients with suspected gallbladder disease were compared with radiographic, surgical, and pathologic findings to determine the accuracy of the ultrasound examinations. In 13 patients, the gallbladder was not visualized by ultrasound. Diagnosis of the presence or absence of gallstones was correctly made by ultrasound in 56 of 63 visualized gallbladders, for an accuracy rate of 89%. A high proportion of nonvisualized gallbladders (10/13) contained gallstones. Previously unreported ultrasound findings of a stone impacted in the proximal cystic duct and findings of a collection of bile in the lesser sac associated with cholelithiasis and choledocholithiasis are illustrated.

2959 GRAY-SCALE ULTRASOUND OF BILIARY TRACT DISEASE: A CORRELATIVE STUDY WITH PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. (Eng.) Cooperberg, P.; Ayre-Smith, G.; Garrow, D. G. (Vancouver General Hosp., Univ. British Columbia, Vancouver, British Columbia V5Z 1M9, Canada). *J. Can. Assoc. Radiol.* 28(4):237-242; 1977.

The specificity and sensitivity of gray-scale ultrasound (US) in the detection of dilatation of intrahepatic bile ducts, as compared to percutaneous transhepatic cholangiography (PTC) was tested in 47 patients who were studied prospectively by both techniques. In 23 patients demonstrated by PTC to have dilated intrahepatic ducts, 18 were detected by US. Of the 11 patients shown to have nondilated ducts by PTC, all were accurately predicted by US. In 13 cases in which PTC was unsuccessful, the US study showed 12 to be nondilated and one to be mildly dilated. Because ultrasound is a noninvasive technique, it should be the primary imaging technique in the evaluation of possible extrahepatic obstructive jaundice.

2960 SERUM BILE ACIDS IN THE DIAGNOSIS OF HEPATOBILIARY DISEASE. (Eng.) Pennington, C. R.; Ross, P. E.; Bouchier, I. A. D. (Ninewells Hosp. and Medical Sch., Dundee, Scotland). *Gut* 18(11): 903-908; 1977.

The value of serum bile acids (SBA) in the diagnosis of hepatobiliary disease was investigated in 14 controls, 16 patients with cirrhosis, 15 with extrahepatic obstruction, 12 with viral hepatitis, 8 with neoplasia, 7 with infectious mononucleosis, and 14 with miscellaneous diseases. A modified gas-liquid chromatographic method was used, with an overall coefficient of variation of ±11% in the control range. Serum was obtained after a 12-hr fast, and 2 hr after a fatty meal from 73 patients and 14 control subjects. In controls, the total fasting SBA of 2.17 ± 0.86 μM increased significantly ($p<0.001$) to 3.81 ± 1.14 μM after a meal. All icteric patients had raised SBA, but, in 23 anicteric patients, there was no significant difference in the detection of chronic liver disease by fasting SBA, postprandial SBA, aspartate aminotransferase, or gamma glutamyl transpeptidase. Compared with controls, serum in patients contained proportionately

less deoxycholic acid ($p<0.001$); there was proportionately more cholic acid in extrahepatic obstruction ($p<0.001$) and proportionately more chenodeoxycholic acid in patients with cirrhosis, viral hepatitis, and neoplasia ($p<0.001$). In controls, the fasting cholic:chenodeoxycholic acid ratio ranged from 0.5–1.0, and differed significantly ($p<0.001$) from patients with extrahepatic obstruction 0.96–3.6, and cirrhosis 0.1–0.5. It is concluded that serum bile acids measured by sensitive methods can provide useful diagnostic information.

2961 FASTING AND POSTPRANDIAL SERUM BILE ACIDS AS A SCREENING TEST FOR HEPATOCELLULAR DISEASE. (Eng.) Angelico, M.; Attili, A. F.; Capocaccia, L. (Dept. Internal Medicine, Univ. Rome, Rome, Italy). *Am. J. Dig. Dis.* 22(11):941–946; 1977.

The significance of postprandial serum bile acid estimation as a test of liver function was evaluated in 19 normal subjects, 20 patients with cirrhosis, 10 with acute hepatitis, 4 with resolving viral hepatitis, and 6 with chronic active hepatitis. A gas–chromatographic method was used. One healthy subject had postprandial serum bile acid levels above the normal range, while seven patients with liver disease had postprandial levels within normal limits. Of the latter group, two had chronic active hepatitis in remission and three had resolving viral hepatitis. Significant correlations were seen between serum bile acid levels and most of the conventional liver function tests (total bilirubin, conjugated bilirubin, alkaline phosphatase, γ-glutamyl-transferase, cholinesterase, Hepato-Quick, and SGPT; correlation coefficients for postprandial serum bile acid levels and these liver function tests were 0.702, 0.663, 0.424, 0.067, −0.373, −0.379, 0.684, and 0.707, resp.; all significant at $p<0.001$ or $p<0.01$ except that for γ-glutamyl-transferase). These data indicate that the postprandial serum bile acid determinations is better than any of the other conventional tests taken separately, but no better than their combined use. No significant modification of the cholic acid/chenodeoxycholic acid ratio was observed between the fasting and the postprandial determinations.

2962 RADIOIMMUNOASSAY OF SERUM-CONJUGATED DEOXYCHOLIC ACID. (Eng.) Matern, S.; Krieger, R.; Hans, C.; Gerok, W. (Medizinische Universitatsklinik, Hugstetter Str. 55, D-78000 Freiburg i.Br., W. Germany). *Scand. J. Gastroenterol.* 12(6):641–647; 1977.

A specific, sensitive, and reliable radioimmunoassay for serum-conjugated deoxycholic acid is described, in which antiserum is obtained after immunization of rabbits with a deoxycholic acid–bovine serum albumin conjugate. The displacement curve of glyco[^{3}H]-deoxycholic acid was linear on a logit-log plot from 7.5 to 320 pmol of unlabeled glycodeoxycholic acid. At 50% displacement of bound label, the cross-reactivity of taurodeoxycholic acid was 100%, deoxycholic acid 30%, taurocholic acid 3%, and glycocholic acid 2%. No cross-reactivity was observed with free cholic acid, conjugated or free chenodeoxycholic acids, and conjugated or free lithocholic acids. Fasting serum-conjugated deoxycholic acid concentrations in 10 healthy volunteers ranged from 0.18 to 0.92 μM. Over a period of 5 hr following 0.5 g p.o. cholate administration, the serum-conjugated deoxycholic acid concentration did not change in five fasting healthy subjects, whereas an initial increase of serum cholic acid was observed.

2963 RADIOIMMUNOASSAY OF SULFATED LITHOCHOLATES. (Eng.) Cowen, A. E.; Korman, M. G.; Hofmann, A. F.; Turcotte, J.; Carter, J. A. (Royal Brisbane Hosp., Brisbane, Australia). *J. Lipid Res.* 18(6):698–703; 1977.

A sensitive, rapid radioimmunoassay for sulfated species of lithocholic acid (sulfolithocholylglycine, sulfolithocholyltaurine, and sulfolithocholic acid) was developed and used to measure the total concentration of sulfated lithocholates in the sera of 50 healthy human subjects. Sulfolithocholylglycine was conjugated to bovine serum albumin by a carbodiimide procedure, and the reaction product, emulsified in Freund's adjuvant, was injected intracutaneously into rabbits. The antiserum obtained was capable of binding 40% of [^{3}H]sulfolithocholylglycine at 1:1,000 dilution. The assay featured a 2-hr binding step at 42 C followed by precipitation of bound tracer with polyethylene glycol at 4 C. The assay can be used with 0.1 ml of serum and was reproducible. The antibody had little affinity for the 3-sulfate of cholic or chenodeoxycholic acid, a number of steroid sulfates, or unsulfated bile acids. In the healthy subjects, mean fasting-state serum levels of immunoreactive sulfated lithocholyl conjugates (+sulfated lithocholate) was 1.6 ± 0.1 μM; based on results with a separate radioimmunoassay for unsulfated lithocholyl conjugates, most of the lithocholate in serum in healthy humans is present in sulfated form.

2964 RADIOIMMUNOASSAY OF UNSULFATED LITHOCHOLATES. (Eng.) Cowen, A. E.; Korman, M. G.; Hofmann, A. F.; Turcotte, J.; Carter, J. A. (Royal Brisbane Hosp., Brisbane, Australia). *J. Lipid Res.* 18(6):692–697; 1977.

A new radioimmunoassay for total unsulfated species of lithocholate (lithocholylglycine, lithocholyltaurine, and lithocholate) in human serum is described, and results obtained with this method in the sera of healthy subjects are reported. Antiserum was raised in rabbits by injection of lithocholylglycine coupled to bovine serum albumin (prepared by a carbodiimide method) and emulsified in complete Freund's adjuvant; antisera capable of measuring 40–120 pmol at 1:400 dilution were obtained. The tracer was [11,12-^{3}H]lithocholylglycine. The radioimmunoassay features a 2-hr binding step at 42 C and a 1-hr separation step using polyethylene glycol. The antibody had the following relative specificities: lithocholylglycine and lithocholyltaurine, 1; litho-

cholate, 1.5; chenodeoxycholylglycine, 20; and deoxycholylglycine, 55. There was no binding of various other free or conjugated sulfated and unsulfated bile acids. The mean fasting-state level in 50 subjects was 0.3 μmol/l (0.14 μg/ml), but 11 of the 50 subjects had levels too low to measure by this technique. The technique is simple, rapid, and precise, and should permit the measurement of unsulfated lithocholate species in health and in some instances of liver disease.

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13274 Marseille Cedex 2, France). *J. Radiol. Electrol. Med. Nucl.* 58(6/7):451-457; 1977.

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3018 NEONATAL HEPATIC CALCIFICATION SECONDARY TO TRANSPLACENTAL INFECTION. (Eng.) Shackelford, G. D.; Kirks, D. R. (Washington Univ. Sch. Medicine, 510 S. Kingshighway Blvd., St. Louis, MO 63110). *Radiology* 122(3):753-757; 1977.

See also, 2648, 2668, 2921, 3020, 3021, 3025, 3032, 3042, 3043, 3044, 3045, 3076, 3091, 3092, 3140, 3161, 3166, 3167, 3186, 3188, 3204, 3210, 3213, 3214, 3215, 3220, 3226, 3233, 3234, 3235, 3237, 3238, 3239, 3274, 3284, 3288, 3314, 3332, 3340, 3352, 3353, 3370, 3376, 3399, 3401, 3413, 3422, 3424, 3447, 3448, 3466.

GASTROINTESTINAL DISEASES

ESOPHAGUS

3019 ULTRASTRUCTURAL CHANGES OF THE VAGUS NERVE IN ESOPHAGEAL ACHALASIA. (Spa.) de la Fuente, A.; Garcia-Calvo, M.; Ramon y Cajal, S.; Paya, J. M.; Cuesta, G. (Hospital Clinico de San Carlos, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 51(6):659-666; 1977.

Ultrastructural changes were studied in biopsy specimens of the vagus nerves from five patients with diagnostically established esophageal achalasia. The micrograms showed the predominance of amyelinated fibers; myelinated fibers were scarce and degenerated. The electron micrographs of the myelinated fibers showed frequent demyelinization with conservation of the axon and Schwann's cells with prominent nuclei and abundant cytoplasm rich in granular endoplasmic reticulum. Some Schwann's cells underwent complete demyelinization. The amyelinated fibers had only one or two axons. Atrophy of Schwann's cells was seen in some amyelinated fibers. The endoneurium was usually rich in collagen fibers, and macrophages with large cytoplasm of irregular shape containing abundant lysosomes and well-developed Golgi complexes were seen occasionally in the interfibrillar space. The findings indicate that alterations of the vagus nerve are obligatory in esophageal achalasia. These alterations appear to be of extra-esophageal origin and of degenerative and progressive character, while the lesions in the esophageal wall are secondary.

3020 DIAGNOSIS OF SYMPTOMATIC GASTROESOPHAGEAL REFLUX BY PROLONGED MONITORING OF LOWER ESOPHAGEAL pH. (Eng.) Irvin, T. T.; Perez-Avila, C. (Royal Infirmary, Sheffield S6 3DA, England). *Scand. J. Gastroenterol.* 12(6):715-720; 1977.

To evaluate the use of prolonged monitoring of the lower esophageal pH in the diagnosis of gastroesophageal reflux, the lower esophageal pH was continuously monitored for 15 hr in 10 asymptomatic subjects and 27 patients with symptoms of gastroesophageal reflux, and the pH measurements in symptomatic patients were compared with the results of other esophageal investigations. Symptomatic patients had significantly longer periods of reflux in the pH test (93.7 ± 28.9 min at pH ≤4 and 204.8 ± 36.6 min at pH ≤5) than asymptomatic subjects (4.8 ± 1.6 min at pH ≤4 and 10.7 ± 3.2 min at pH ≤5, $p<0.01$), but there was no significant correlation between the pH measurements and the results of esophageal manometry, acid perfusion, and acid clearing tests. Ten patients had evidence of esophagitis at esophagoscopy, but there was no correlation between pH measurements and the findings at esophagoscopy. Two patients with esophagitis had no evidence of reflux in the pH monitoring test. The results indicate that the pH monitoring test is useful in the diagnosis of gastroesophageal reflux in patients who do not have endoscopic signs of esophagitis. However, negative pH tests do not exclude the diagnosis of symptomatic reflux, and it appears that the test has no value in assessing the severity of esophageal inflammation.

3021 QUANTITATION OF GASTROESOPHAGEAL REFLUX BEFORE AND AFTER THERAPY USING THE GASTROESOPHAGEAL SCINTISCAN. (Eng.) Malmud, L. S.; Fischer, R. S. (Temple Univ. Sch. Medicine, Philadelphia, PA 19140). *South. Med. J.* 71(Suppl. 1): 10-15; 1978.

The scintiscanning technique was used to detect and quantitate gastroesophageal reflux before and after therapy in 30 patients with symptomatic heartburn and a positive reflux test and in 20 normal controls. In 10 patients, the reflux was studied both with and without a tube assembly with an isotopic marker positioned at the lower esophageal sphincter (LES). The scintiscans were obtained after the instillation of 300 ml of isotonic saline with 100 to 300 μCi ^{99m}Tc sulfur colloid. It was shown that reliable scintiscans can be obtained both with and without the tube. Visible reflux was detected in 27 of 30 symptomatic patients at 10-20 mm Hg, and the computed reflux index was 11.7 ± 1.8%. In 18 of 20 controls, no visible reflux was observed, while the reflux index was 2.7 ± 0.3% when pressure gradient increased to approximately 35 mm Hg. The difference in reflux indices between the two groups was significant ($p<0.001$). Changes in body position (upright versus supine) caused a decrease in reflux from 14.8 ± 3.3% to 7.6 ± 1.7% ($p<0.05$) and in LES pressure from 8.4 ± 0.08% to 6.0 ± 0.09% ($p<0.05$). An antacid-alginate preparation reduced the reflux index from 9.9 ± 1.3% to 6.5 ± 0.8% ($p<0.01$) without a significant change in LES pressure. None of the other standard diagnostic techniques (i.e., radiographic hiatal hernia, fluoroscopic reflux, LES pressure, phenol red reflux, acid perfusion, endoscopic esophagitis, and histologic esophagitis), to which the method was compared, were as sensitive. The gastroesophageal scintiscan is a reliable, noninvasive test for gastroesophageal reflux.

3022 A MULTICENTRIC, RANDOMIZED CLINICAL TRIAL OF GAVISCON IN REFLUX ESOPHAGITIS. (Eng.) McHardy, G. (Dept. Medicine, Louisiana State Univ. Medical Center, New Orleans, LA). *South. Med. J.* 71(Suppl. 1):16-21; 1978.

A multicentric evaluation of Gaviscon was performed to determine whether it is equally effective as a standard antacid in symptomatic relief of reflux esophagitis. One hundred thirty-three patients from 13 treatment centers were involved in the studies, 65 of whom received Gaviscon and 68 of whom received an antacid. Gaviscon contained 200 mg of alginic acid, 80 mg of aluminum hydroxine dried gel, 20 mg of magnesium trisilicate, and 70 mg of sodium bicarbonate per tablet. Antacid tablets were of the same physical characteristic as Gaviscon tablets and were formulated to meet the requirements of the *in vitro* test set by the Food and Drug Administration. The treatment regimens were identical in both groups. The patients were instructed to chew two tablets followed by a glass of water after each meal, at bedtime, and whenever heartburn occurred. They re-

corded the daily amount of medication, number and intensity of heartburn attacks, grade of relief, and the number of bowel movements. Physical examination and esophagoscopy were performed before and after the experiment. Heartburn scores, obtained by multiplying heartburn incidence by its severity, indicated no significant difference between the two treatment groups at the end of four weeks. Tablet consumption was similar in both groups. Esophagoscopy showed that Gaviscon and standard antacid were equally effective in causing a significant decrease in the severity of the specific signs of esophagitis, friability, erosion, and ulceration, as well as in such nonspecific signs as hyperemia, edema, and exudate. The low amount of antacid in Gaviscon did not cause any of the side-effects that may occur with standard antacids. Gaviscon appears to be an effective medication in the symptomatic relief of reflux esophagitis.

3023 GASTRIC EMPTYING AND ANTRAL MOTILITY IN REFLUX ESOPHAGITIS: EFFECT OF ORAL METOCLOPRAMIDE. (Eng.) Behar, J.; Ramsby, G. (Rhode Island Hosp., 593 Eddy St., Providence, RI 02902). *Gastroenterology* 74(2, Part 1):253-256; 1978.

Antral function was investigated by studying gastric emptying of the liquid phase of a meal and fasting antral contractility in 13 patients with reflux esophagitis and in 9 age-matched controls. Gastric emptying half-time ($T_{\frac{1}{2}}$) in reflux esophagitis patients was no different from that of control subjects ($p<0.30$). Antral contractility (number of antral contractions and the cumulative antral activity), however, was lower in reflux esophagitis patients than in control subjects ($p<0.001$). The p.o. administration of metoclopramide (15 mg) accelerated gastric emptying, increased the number of antral contractions as well as the cumulative antral activity in patients with reflux esophagitis ($p<0.001$). However, it only increased the cumulative antral activity in normal subjects ($p<0.01$). These results suggest that metoclopramide may be potentially beneficial to reflux esophagitis patients by reducing the volume of gastric contents available for gastroesophageal reflux.

3024 ANTIREFLUX SURGERY FOR SYMPTOMATIC GASTROESOPHAGEAL REFLUX: MECHANISM OF ACTION. (Eng.) Fisher, R. S.; Malmud, L. S.; Lobis, I. F.; Maier, W. P. (Temple Univ. Health Sciences Center, 3401 N. Broad St., Philadelphia, PA 19140). *Am. J. Dig. Dis.* 23(2):152-160; 1978.

To determine the effects of Nissen fundoplication upon the symptoms of reflux and on the diagnostic tests employed to evaluate reflux, and to examine the relationship between gastroesophageal reflux and lower esophageal sphincter pressure before and after fundoplication, 10 patients with symptomatic reflux were studied before and after operation. Clinical evaluation, barium esophagography, endoscopy with mucosal biopsy, esophageal manometry, acid-perfusion and acid-reflux testing, and gastroesophageal scintiscanning were performed on each patient before and after surgery. Following fundoplication, marked symptomatic, radiographic, endoscopic, and histologic improvement was observed. Serial acid-reflux tests at increasing gastroesophageal pressure gradients returned to normal after surgery. Lower esophageal sphincter (LES) pressure increased from 8.2 ± 1.3 to 12.0 ± 1.5 mm Hg ($p<0.01$). In addition, surgery resulted in a significant decrease in the gastroesophageal reflux index from 17.4 ± 2.4 to 2.7 ± 1.1% ($p<0.001$). The pre- and postoperative resting LES pressures did not correlate significantly with corresponding gastroesophageal reflux indices for individual patients. It is concluded that increased LES pressure alone does not adequately explain the functional and clinical improvement that follows fundoplication.

3025 TRANSMUCOSAL POTENTIAL DIFFERENCE: DIAGNOSTIC VALUE IN GASTRO-OESOPHAGEAL REFLUX [Abstract]. (Eng.) Khamis, B.; Kennedy, C.; Finucane, J.; Doyle, J. S. (St. Laurence's Hosp., Dublin, Ireland). *Gut* 18(11):A973-A974; 1977.

3026 PATTERN OF NOCTURNAL GASTRO-OESOPHAGEAL REFLUX [Abstract]. (Eng.) Goodall, R. J. R.; Hay, D. J.; Ward, D. W.; Temple, J. G. (Hope Hosp., Manchester, England). *Gut* 18(11):A973; 1977.

3027 SIGNIFICANCE OF MEASUREMENTS OF LOWER OESOPHAGEAL SPHINCTER PRESSURE IN PATIENTS WITH SYMPTOMATIC GASTRO-OESOPHAGEAL REFLUX [Abstract]. (Eng.) Greaney, M. G.; Chattopadhyay, D. K.; Irvin, T. T. (Royal Infirmary, Sheffield, England). *Gut* 18(11):A975-A976; 1977.

3028 GASTRO-ESOPHAGO-PHARYNGEAL REFLUX. (Eng.) Chodosh, P. L. (801 Westminster Ave., Hillside, NJ 07205). *Laryngoscope* 87(9, Part 1): 1418-1427; 1977.

3029 UPPER ESOPHAGEAL SPHINCTER DYSFUNCTION IN PATIENTS WITH ESOPHAGEAL PHARYNGEAL REGURGITATION [Abstract]. (Eng.) Shuck, T.; Gerhardt, D. C.; Winship, D. H. (Dept. Medicine, Univ. Missouri, Columbia, MO 65201). *Gastroenterology* 72(5, Part 2):1131; 1977.

3030 SURGICAL TREATMENT OF GASTROESOPHAGEAL REFLUX AND ITS COMPLICATIONS. (Eng.) Woodward, E. R. (Dept. Surgery, Univ. Florida, Gainesville, FL 32610). *World J. Surg.* 1(4):453-461; 1977.

3031 FOOD SENSITIVITY IN REFLUX ESOPHAGITIS [Abstract]. (Eng.) Price, S. F.; Smithson, K. W.; Castell, D. O. (Natl. Naval Medical Center, Bethesda, MD). *Gastroenterology* 72(5, Part 2):1114; 1977.

ESOPHAGUS

3032 THE LOWER ESOPHAGEAL RING AND ESOPHAGEAL REFLUX [Abstract]. (Eng.) Scharschmidt, B. F.; Watts, H. D. (Dept. Medicine, Univ. California, San Francisco, CA). *Gastroenterology* 72(5, Part 2):1126; 1977.

3033 REFLUX ESOPHAGITIS. (Ger.) Allgower, M.; Siewert, R. (Kantonsspital d. Univ. Basel, Kantonsspital, CH-4004 Basel, Switzerland). *Langenbecks. Arch. Chir.* 341(4):231-237; 1976.

3034 QUANTITATIVE ASSESSMENT OF BETHANECHOL, ANTACID FOAM TABLETS, AND BED ELEVATION IN THERAPY OF GASTROESOPHAGEAL REFLUX [Abstract]. (Eng.) Johnson, L. F.; DeMeester, T. R. (Walter Reed Medical Center, Washington, DC). *Gastroenterology* 72(5, Part 2):1161; 1977.

3035 LOWER ESOPHAGEAL SPHINCTER (LES) DYSFUNCTION IN PATIENTS WITH EPIPHRENIC DIVERTICULA [Abstract]. (Eng.) Meunier, L.; Duranceau, A.; Hurwitz, A. (Dept. Surgery, Hotel-Dieu de Montreal, Montreal, Quebec, Canada). *Gastroenterology* 72(5, Part 2):1101; 1977.

3036 INTRAMURAL ESOPHAGEAL DIVERTICULOSIS. (Eng.) Rahlf, G.; Wilbert, L.; Lankisch, P. G.; Huttemann, U. (Inst. Pathology, Univ. Gottingen, Gosslerstr. 10, 3400 Gottingen, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 24(2): 110-115; 1977.

3037 TREATMENT OF IRRADIATION ESOPHAGITIS--VALUE OF HYDROCORTISONE INJECTION [Abstract]. (Eng.) Nelson, R. S.; Hernandez, A. J.; Goldstein, H. M.; Saca, A. (Univ. Texas System Cancer Center, Houston, TX). *Gastroenterology* 72(5, Part 2):1107; 1977.

3038 EVIDENCE SUGGESTING PROSTAGLANDINS MEDIATE LOWER ESOPHAGEAL SPHINCTER (LES) INCOMPETENCE ASSOCIATED WITH INFLAMMATION [Abstract]. (Eng.) Brown, F.; Beck, B.; Fletcher, J.; Castell, D.; Eastwood, G. (Natl. Naval Medical Center, Bethesda, MD). *Gastroenterology* 72(5, Part 2): 1033; 1977.

3039 CAROTID ARTERY ESOPHAGEAL FISTULA AS A CAUSE OF UPPER GASTROINTESTINAL BLEEDING [Abstract]. (Eng.) Khan, S. A.; Vasu, M. (Butterworth Hosp., Grand Rapids, MI). *Gastroenterology* 72(5, Part 2):1080; 1977.

3040 SELECTIVE INTRAARTERIAL VASOPRESSIN FOR UPPER GASTROINTESTINAL HEMORRHAGE: A CONTROLLED TRIAL [Abstract]. (Eng.) Mallory, A.; Schaefer, J. W.; Cohen, J. R.; Holt, S. A.; Norton, L. W. (Denver General Hosp., Denver, CO). *Gastroenterology* 72(5, Part 2):1093; 1977.

3041 SIMPLIFIED HIATUS HERNIORRHAPHY. (Eng.) Lally, J. J.; Gist, W. W.; Petit, C. A. (Kansas City General Hosp., Medical Center, Kansas City, MO). *South Med. J.* 70(9):1086-1087; 1977.

See also, 2983, 2985, 2987, 2994, 2995, 3060, 3337, 3411, 3442, 3447, 3449, 3450, 3451.

STOMACH

3042 QUANTITATION AND IMMUNOCHEMICAL CHARACTERIZATION OF CARCINOEMBRYONIC ANTIGEN AND GLUCOSE PHOSPHATE ISOMERASE IN BLOOD AND WASHINGS OF PATIENTS WITH GASTRIC AND COLONIC DISEASES. (Eng.) Munjal, D.; Brady, P. G. (Coll. Medicine, Univ. Kentucky, Lexington, KY 40506). *Am. J. Dig. Dis.* 23(1):57-64; 1978.

Carcinoembryonic antigen (CEA) and glucose phosphate isomerase (GPI) were measured in the serum and colonic washings of 51 subjects with gastric and colonic diseases to establish the usefulness of these two markers in the diagnosis of cancer. In addition, the chromatographic and immunologic properties of CEA from colonic washings were determined and compared with the characteristics of pure CEA. The levels of both markers in the serum were higher in gastric and colonic cancer patients than in normals or patients with other diseases. Elevations of both these markers were most frequent in patients with metastases; all five patients with metastases had a CEA level greater than 2.5 ng/ml, and three of the five had a simultaneously elevated GPI level. No correlation was found between total protein content and concentrations of CEA or GPI in the washings. Further characterization of the perchloric acid-soluble material from colon washings by gel filtration indicated that the CEA-like substance from colon cancer patients was higher in molecular weight than standard radiolabeled CEA or CEA from normal colon washings. When tested against anti-CEA antiserum and pure CEA from a colonic cancer metastasis, all CEA preparations showed immunological identity in gel-diffusion plates; on immunoelectrophoresis, similar mobility was indicative of a similar charge. Determination of CEA content in colonic washings is not presently a useful diagnostic tool, and the relationship be-

tween GPI in tumors and GPI in washings is still unknown and awaits isolation and characterization from both these sources.

3043 EARLY GASTRIC CARCINOMA: VALUE OF COMBINED USE OF ENDOSCOPY, AIR CONTRAST X-RAY FILMS, CYTOLOGY, AND MULTIPLE BIOPSY SPECIMENS. (Eng.) Qizilbash, A.; Harnarine, C.; Castelli, M. (Henderson General Hosp., 711 Concession St., Hamilton, Ontario L8V 1C3, Canada). *Arch. Pathol. Lab. Med.* 101(11): 610-614; 1977.

Experience with five cases of early gastric carcinoma diagnosed during a 1-yr period at one Canadian hospital is presented. All five patients were symptomatic and were diagnosed by a combination of endoscopy, roentgenology, brush cytology, and biopsy specimens. No cases of early gastric carcinoma were diagnosed at this hospital in the preceding 10 yr. Seventy-five percent of the cytological preparations were positive, and all five biopsy specimens showed carcinoma. The ulcerated or type III lesion was present in three cases. No lymph node metastases were present in the gastrectomy specimens. The increasing rate of detection of early gastric carcinoma is attributed to the use of upper gastrointestinal endoscopy, air-contrast barium meal examinations, cytology, and multiple biopsy specimens.

3044 THE RADIOLOGICAL FEATURES OF GASTRIC LYMPHOMA. (Eng.) Privett, J. T. J.; Davies, E. R.; Roylance, J. (Coventry and Warwickshire Hosp., England). *Clin. Radiol.* 28(4):457-463; 1977.

The radiological features of 18 cases of gastric lymphoma are reviewed. The appearances on barium meal were not uniform. Localized masses were seen in seven cases; four had smooth lobulated filling defects at the fundus with sharp re-entrant angles; and three had prepyloric filling defects with sharp re-entrant angles. Thickening of the mucosal folds was seen in six cases; in two cases the abnormality involved the whole stomach and extended into the duodenum, while in four cases the fundus was spared. Local pyloric rigidity was seen in four cases, and in two of these the abnormality extended into the duodenal bulb. The greatest difficulty in the diagnosis of gastric lymphoma is distinguishing it from gastric carcinoma. Even when the barium examination is obviously abnormal, the abnormality is not always recognizable as lymphoma. The following features may be used to distinguish gastric lymphoma from gastric carcinoma: distensible stomach in the presence of a mass, mucosal hypertrophy in the presence of a mass, mucosal hypertrophy associated with large gastric ulcer or multiple gastric ulcers, contiguous spread of the abnormality into the duodenal cap, duodenal ulceration associated with gastric mass, evidence of lymphoma elsewhere, and the youth of the patient (one of the 18 patients was 16 yr old; carcinoma is extremely rare at this age).

3045 β-GLUCURONIDASE AND THE GASTRIC EPITHELIAL CELL. A STUDY USING ORGAN CULTURE. (Eng.) Tayler, R.; Orwell, R. L.; Piper, D. W. (Royal North Shore Hosp., St. Leonards, New South Wales 2065, Australia). *Digestion* 16(1/2):40-47; 1977.

In vitro studies were performed to determine the significance of an increased β-glucuronidase level in the gastric juice of patients with gastric carcinoma. Gastric mucosa obtained during surgery from patients with chronic peptic ulcer or gastric carcinoma was cultured *in vitro*, and the effects of a carcinogen (*N*-methyl-*N*^{1}-nitro-*N*-nitrosoguanidine, NG) and a cytotoxic agent (nitrogen mustard) were studied. The rate of ^{14}C-glucose and ^{3}H-glycine incorporation were measured as indices of cell viability. The content of β-glucuronidase and lactic acid in the ambient fluid and LDH isoenzyme pattern of a homogenized sample of cultured tissue were the indices characterizing carcinogenic activity. The addition of NG to cultures caused an insignificant decrease in viability, while nitrogen mustard significantly decreased the viability by 90%. NG caused a significant increase in β-glucuronidase and lactate formation in the ambient fluid, regardless of the source of the gastric mucosa. When nitrogen mustard was added to the culture, β-glucuronidase and lactate production were significantly lower than in the control medium. The mean LDH M/H ratio at the end of the experiment (120 hr) was higher in the medium of tissues cultured with NG than in control medium, but the change was statistically insignificant ($0.05<p<0.1$). The increased production of β-glucuronidase and lactate by the gastric mucosa incubated with a carcinogen suggests that the increased β-glucuronidase activity in the gastric juice of patients indicates malignancy.

3046 CYTOPLASMIC LEUCINE NAPHTHYLAMIDASE ACTIVITY EXPRESSED IN SIGNET-RING CELL CARCINOMA OF THE STOMACH. (Eng.) Kubota, K.; Yamada, S.; Ito, M.; Nakamura, W.; Nagayo, T. (Aichi Cancer Center, Tashiro-cho, Kanokoden, Chikusa-ku, Nagoya 464, Japan). *J. Natl. Cancer Inst.* 59(6):1599-1604; 1977.

Histochemical studies were carried out in signet-ring cells in surgically resected gastric carcinomas from 64 patients. On the basis of PAS reactivity of the intracellular mucin, the signet-ring cells were classified as type A (immature), type B (intermediate), or type C (mature). Different staining reactions to Alcian blue at pH 2.5 enabled type C cells to be subclassified as C-1 or C-2. In 63/64 cases, intense leucine naphthylamidase (LNAase) activity was found in the cytoplasm of nearly all cancer cells except type C-2. Localization of LNAase activity in the cytoplasm was confirmed by conventional biochemical assay. These findings do not support the classification of the signet-ring carcinoma as a poorly differentiated adenocarcinoma. The authors believe that the signet-ring carcinoma is a cancer with some functions attributable to its cellular characteristics.

3047 GASTRIC DEVASCULARIZATION: A USEFUL SALVAGE PROCEDURE FOR MASSIVE HEMORRHAGIC GASTRITIS. (Eng.) Richardson, J. D.; Aust, J. B.

In: Transactions of the Southern Surgical Association Eighty-Eighth Annual Meeting Held at the Breakers Palm Beach, Florida, December 6, 7, 8, 1976. (Philadelphia: J. B. Lippencott Co.): 88: 157-163; 1977.

Due to poor results with conventional operative therapy for diffuse hemorrhagic gastritis (DHG), a prospective evaluation of gastric devascularization was carried out in 21 patients. Sepsis, alcoholism, and steroid abuse were the common etiologic factors. Eighteen patients had previously undergone vagotomy and pyloroplasty, and 19 patients had undergone gastric resection. In spite of the fact that these were all critically ill patients, all stopped bleeding with gastrin devascularization, and only two rebled. The average operating time was 84 min. There were two operative complications, and gastric necrosis did not occur. The mortality was high (38%) due to the primary disease. Gastric devascularization is a useful salvage procedure for the patient with DHG because it can be accomplished rapidly, with few complications, has a low rebleed rate, and causes no permanent sequelae. Gastric devascularization is in many ways the ultimate ischemic preparation for the gastric mucosa, which attests to the poor understanding of this complex disease, since only 2/21 patients rebled.

3048 BILE ACID COMPOSITION IN PATIENTS WITH AND WITHOUT SYMPTOMS OF POSTOPERATIVE REFLUX GASTRITIS. (Eng.) Gadacz, T. R.; Zuidema, G. D. (Veterans Admin. Hosp., 3900 Loch Raven Blvd., Baltimore, MD 21218). *Am. J. Surg.* 135(1):48-52; 1978.

Gastric aspirates from symptomatic and asymptomatic patients with bile reflux after operation for duodenal ulcer were quantitatively and qualitatively analyzed to determine if there is a relation between bile acid concentrations and symptoms of bile reflux after surgery. Four patients were asymptomatic, and the bile composition was normal. Three patients were symptomatic and had a significant increase in secondary bile acids (36.3% of total bile acids, compared with 13.2% in asymptomatic patients, $p<0.05$), which was accounted for by an increase in deoxycholic acid. The concentration of bile acid was similar in the two groups. This alteration in bile acid composition, with an increase in deoxycholic acid, may be an important factor in determining which patients with bile reflux develop gastritis.

3049 SIMULTANEOUS MANIFESTATION OF MENETRIER'S DISEASE. SUPERFICIAL ULCERATION (DIEULAFOY'S DISEASE) AND EARLY GASTRIC CANCER (A CASE REPORT). (Ger.) Stosiek, P.; Ebermann, W.; Varga, A. (Bezirkskrankenhaus, Girbigsdorfer Str. 1/3, DDR-89 Gorlitz, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 37(5/6):247-253; 1977.

Acute gastric hemorrhage prompted gastric resection in a 51-yr-old man with uneventful familial and personal anamnesis. Type IIb early gastric cancer, superficial ulceration (Dieulafoy's disease), and morphological changes typical of Menetrier's disease were found in the surgical specimen. The patient was discharged in good condition 5 weeks after surgery. Alpha-1-antitrypsin was found in the feces 1 yr after surgery. The combination of these three diseases has not been described before in the literature. Superficial erosion is not uncommon in Menetrier's disease. Many case reports and epidemiological studies show a relationship between Menetrier's disease and early gastric cancer.

3050 RECURRENCE RISKS IN COMPLEX INHERITANCE WITH SPECIAL REGARD TO PYLORIC STENOSIS. (Eng.) Lalouel, J. M.; Morton, N. E.; MacLean, C. J.; Jackson, J. (Population Genetics Lab., Univ. Hawaii at Manoa, 1980 East-West Rd., Honolulu, HI 96822). *J. Med. Genet.* 14(6):408-414; 1977.

A mixed model was applied to a body of data on pyloric stenosis to determine recurrence risks, whose incidence varies with sex, birth order, and ethnic group. Data for this analysis were drawn from three previously published studies of familial incidence of pyloric stenosis performed in Great Britain. The mixed model postulates an underlying scale of liability, to which a major locus, a polygenic component, and environment contribute independently. The major locus is assumed to be biallelic, producing three genotypes. The polygenic and environmental factors are assumed to be independent and normally distributed. Population incidences of pyloric stenosis were the input data in segregation analysis. Probability of ascertainment was established separately for each subsample because of heterogeneity among the subsamples. The hypothesis of the mixed model, the generalized single locus model, and the multifactorial model were employed in the segregation analysis. Recurrence risks of pyloric stenosis for various family histories can be computed with the program RISK, which is described. Examples were given to illustrate how risks vary with family history. It is concluded that in the majority of cases of pyloric stenosis, the method of computing the recurrence risks on the basis of the mixed model is adequate and reliable.

3051 GASTRIC EPITHELIAL CELL TURNOVER, MUCUS PRODUCTION, AND HEALING OF GASTRIC ULCERS WITH CARBENOXOLONE. (Eng.) Domschke, W.; Domschke, S.; Hagel, J.; Demling, L.; Croft, D. N. (Dept. Medicine, Univ. Erlangen-Nurnberg, Erlangen, W. Germany). *Gut* 18(10):817-820; 1977.

The effects of carbenoxolone on proliferation and mucus production were studied in 17 patients with gastric ulcer before and after ulcer healing with carbenoxolone treatment and in 19 healthy subjects. Gastric DNA loss was measured as an index of epithelial cell turnover, and *N*-acetylneuraminic acid (NANA) content of gastric juice as an index of mucus secretion. In normal subjects there was a negative correlation ($p<0.025$) between gastric DNA

loss and NANA secretion: the lower the cell turnover, the higher the NANA production. In gastric ulcer patients, DNA loss or turnover was significantly ($p<0.01$) higher than normal, and fell significantly ($p<0.01$) after 4 weeks of treatment with carbenoxolone, when 16 of the 17 ulcers had healed. At the same time, NANA output increased significantly ($p<0.01$). It is suggested that patients with gastric ulcer lose cells at a high rate that is returned to normal by carbenoxolone, thus allowing the epithelial cells to mature within the mucosa and produce more mucus.

3052 FIRST CLINICAL EXPERIENCES WITH CHOLESTYRAMINE FOR THE PROPHYLAXIS OF STRESS ULCER. (Ger.) Schumpelick, V.; Grossner, D. (Chirurgischen Universitatsklinik und -Poliklinik, Martinistr. 52, D-2000 Hamburg 20, W. Germany). *Munch. Med. Wochenschr.* 119(41):1329-1332; 1977.

Sixty-eight patients at risk of stress ulcer were treated prophylactically with cholestyramine (2 g/2 hr in 20 ml water) with a probang and/or an antacid (Gelusil Lac). Polytrauma with or without involvement of the skull and brain, surgical intervention, burn, reanimation, and sepsis were the indications of the prophylactic treatment. Forty-four patients received cholestyramine, including eight patients who also received antacid. Twenty-four patients received antacid only. None of the 44 cholestyramine-treated patients developed stress ulcer, but one patient, who received cholestyramine without antacid, had bleeding from an erosion that was controlled conservatively. Two of the 24 antacid-treated patients developed bleeding stress ulcers; 1 of them died from the indirect sequelae of the hemorrhage. No side-effects of treatment were observed. The findings indicate the effectiveness of cholestyramine in the prophylaxis of stress ulcer. The elimination of the ulcerogenic function of the duodenogastric reflux is discussed as the possible mode of action of cholestyramine.

3053 GASTRIC ULCER: EFFECT OF HEALING ON GASTRIC ACID SECRETION AND FASTING SERUM GASTRIN LEVELS. (Eng.) Boyle, J. M.; Hurwitz, A. L.; Jones, R. S.; Mansbach, C. M., II (Univ. Hosp. Cleveland, Cleveland, OH 44106). *Am. J. Dig. Dis.* 22(12):1037-1039; 1977.

To determine whether the normal or low gastric acid output observed during active gastric ulceration is an intrinsic property of the gastric mucosa or if acid output is lowered by factors that precipitate the active ulceration, basal and peak gastric acid outputs and fasting serum gastrin levels were studied before and after healing in 15 patients with uncomplicated benign gastric ulcers. The mean basal acid output (4.0 ± 1.3 mEq H^+/hr), the mean peak acid output (29.5 ± 5.1 mEq H^+/hr), and the mean fasting serum gastrin level (80.3 ± 16.7 pg/ml) in these patients did not change significantly with healing. Failure of gastric secretory function to change with healing suggests that mucosal resistance factors are more important than gastric acid secretion in the pathogenesis of a gastric cancer.

3054 GASTRIC ULCERATION IN PATIENTS RECEIVING INTRAHEPATIC INFUSION OF 5-FLUOROURACIL. (Eng.) Narsete, T.; Ansfield, F.; Wirtanen, G.; Ramirez, G.; Wolberg, W.; Jarrett, F. (Univ. Wisconsin Center for Health Sciences, Madison, WI). *Ann. Surg.* 186(6):734-736; 1977.

The cases of 8 patients who developed gastric ulcer, and were among 251 receiving intrahepatic arterial infusion chemotherapy for hepatic metastases, were reviewed. All patients received 5-fluorouracil (5-FU, 20-30 mg/kg for 4 days, followed by 15 mg/kg for 17 days). Bleeding occurred in four of the eight ulcer patients and perforation in one. In all cases, the catheter tip had been dislodged and was proximal to its correct position, allowing the stomach to be directly infused with 5-FU. No duodenal ulcers were noted. All patients were symptomatic for several days before the diagnosis was made. Of 20 patients with catheter dislodgement, 5 had documented ulcers, 3 had upper gastrointestinal bleeding of undetermined etiology, 8 had epigastric pain or vomiting, and only 4 were asymptomatic. Prompt determination of catheter position is necessary in patients receiving intrahepatic arterial infusion of 5-FU if symptoms consistent with gastric ulceration occur. Gastric ulcers should be vigorously treated because of the high rate of complications in patients receiving chemotherapy.

3055 ACUTE MULTIPLE GASTRIC ULCERS IN THE PYLORIC ANTRUM. (Eng.) Yoshida, T.; Kubo, H.; Murata, H.; Ando, K.; Ishii, H.; Miyagi, F. (Saitama Medical Coll., 38 Morohongo, Moroyama, Jruma-Gun, Saitama-Ken, Japan). *Endoscopy* 9(4): 223-228; 1977.

Clinical studies on the causes and development of acute multiple gastric ulcers were performed on outpatients who suffered from fulminant epigastralgia, vomiting, and nausea. Endoscopic examination of these patients was made every few days. The ulcer presented in four clinical stages. During a preparatory (resting) period (stage 1) several minor hemorrhagic erosions in the upper part of the gastric body were found, but no abnormalities in the pyloric antrum were observed. In 25 patients (89%) who continued excessive use of liquors and food or coffee, nausea and vomiting with abrupt epigastralgia occurred, and 3 patients (10%) had hematemesis and melena. Endoscopy showed hemorrhagic erosions surrounding the pyloric sphincter. It was defined as an early ulcer stage 2. Two to five days later, the hemorrhagic erosions subsided, but symmetrical linear ulcers appeared on the pyloric sphincter, occasionally accompanied by one or two ulcers above the gastric angle (stage 3). After seven weeks of treatment, a stage of scarred healing was observed (stage 4). The disease occurred most frequently in juvenile and middle-aged patients. Its incidence increased in spring and summer. Gastric biopsies demonstrated cytomegalic inclusion bodies (CMIB). Hyperchlorhydria was found in 89% of the patients during the acute phase of the disease, but it decreased spontaneously with time. It is suggested that a virus may invade the mucosa, and CMIB obstructs the capillary endo-

thelium, which causes erosions. Excessive ingestion of food, liquors, or coffee leads to the multiple gastric ulcers.

3056 AN ELECTRON MICROSCOPIC STUDY OF THE CILIATED CELLS IN THE HUMAN GASTRIC MUCOSA. (Eng.) Okuda, T.; Ogata, T. (Okayama Univ. Medical Sch., Okayama, 700 Japan). *Arch. Histol. Jpn.* 39(3):149-156; 1976.

The cytological features of ciliated cells found in the mucosa of the human stomach in three patients are described. In two cases, they occurred in the pyloric mucosa of patients with intestinal metaplasia who were operated on for duodenal ulcer. In the other case, they occurred within a polypoid lesion. They were located in small limited areas. The cells were densely ciliated, each cilium showing a typical 9 + 2 fibrilar pattern. Ciliated cells are not found in normal gastric mucosa, suggesting that they occur only in pathologically altered mucosa.

3057 KREBS CYCLE, PENTOSE PHOSPHATE PATHWAY, AND GLYCOLYSIS IN THE UNINVOLVED GASTRIC MUCOSA OF PEPTIC ULCER AND GASTRIC CANCER PATIENTS. (Eng.) Orwell, R. L.; Piper, D. W. (Royal North Shore Hosp. Sydney, St. Leonards, New South Wales 2065, Australia). *Gastroenterology* 73(6):1320-1325; 1977.

The body and antral mucosa of chronic peptic ulcer patients, together with the body mucosa, antral mucosa, and tumor tissue of gastric cancer patients, were compared in *in vitro* experiments as regards rates of glucose utilization, the relative contributions to glucose metabolism of the pentose phosphate pathway and Krebs cycle, and the rates of glycolysis within the tissues. [^{14}C]glucose counts retained by the tissue, glycolysis, and pyruvate formation were also measured. Tumor tissue from the cancer patients was included in the study. Less than 1.2% of the glucose entering the tissues was metabolized via the pentose phosphate pathway, suggesting that this pathway plays a minor role in energy production from glucose. The major determinant of energy production was the Krebs cycle. Its contribution to glucose metabolism was greatest in the body mucosa of duodenal ulcer patients, less in the uninvolved body mucosa of gastric ulcer patients, and lower still in the corresponding body mucosa of gastric cancer patients. The low levels of Krebs cycle activity seen in the latter tissue resembled those of uninvolved antral mucosa. The smallest Krebs cycle contribution was seen in tumor tissue. [^{14}C]glucose counts retained by the tissue and glycolysis both tended to vary inversely with Krebs cycle activity among the tissues studied. Thus, both were small in the body mucosa of noncancer patients and somewhat larger in the body mucosa of cancer patients, in uninvolved antral mucosa, and in tumor tissue.

3058 REFLUX CONTROL FOLLOWING GASTROPLASTY. (Eng.) Henderson, R. D. (Women's Medical Coll. Hosp., 76 Grenville St., Toronto, Ontario M58 1B2, Canada). *Ann. Thorac. Surg.* 24(3):206-214; 1977.

3059 TEMPORARY TUBE GASTROSTOMY: A FIVE YEAR STUDY. (Eng.) Olivencia, J. A.; Berardi, R. S. (Veterans Admin. Hosp., Des Moines, IA). *J. Iowa Med. Soc.* 67(9):362-366; 1977.

3060 THE ADVANTAGES OF COMBINING POSTERIOR GASTROPEXY WITH PROXIMAL GASTRIC VAGOTOMY. (Eng.) Sankar, M. Y.; Old, J. M.; Trinder, P.; Bose, A. A. K.; Lobo, F.; Hancock, D. M. (General Hosp., Chester Rd., Sunderland, England). *Chir. Gastroenterol.* 10(4):389-392; 1976.

3061 ELECTRICAL, CONTRACTILE, AND RADIOGRAPHIC STUDIES OF THE STOMACH AFTER PROXIMAL GASTRIC VAGOTOMY. (Eng.) Rosenquist, C. J.; Carrigg, J. W.; Regal, A. M. Y.; Kohatsu, S. (Veterans Admin. Hosp., Palo Alto, CA 94304). *Am. J. Surg.* 134(3):338-342; 1977.

3062 ENDOSCOPY OF JEJUNAL SUBSTITUTE STOMACH [Abstract]. (Eng.) Tolg, M.; Schmitt-Koppler, A. (Kreiskrankenhaus, Offenburg, W. Germany). *Endoscopy* 9(2):116; 1977.

3063 IMMUNOHISTOLOGICAL STUDY OF NORMAL EPITHELIAL ANTIGEN AND OF CEA-LIKE SUBSTANCES IN VARIOUS GASTRIC DISEASES [Abstract]. (Eng.) Rapp, W.; Wurster, K. H. (Medizinische Universitats-Klinik DKZ, Heidelberg, W. Germany). *Rend. Gastroenterol.* 9(1):78; 1977.

3064 CARCINOEMBRYONIC ANTIGEN IN GASTRIC DISEASES [Abstract]. (Eng.) Cohen, M. I.; Widerlite, L.; Bunn, P.; Nugent, P. (No affiliation given). *Gastroenterology* 72(5, Part 2): 1156; 1977.

3065 NUCLEAR BINDING OF TRITIATED ACTINOMYCIN IN SURFACE EPITHELIAL CELLS FROM NORMAL STOMACH AND ATROPHIC GASTRITIS [Abstract]. (Eng.) Stoffels, G. L.; Preumont, A. M.; De Reuck, M. (Hopital Universitaire Brugmann, Bruxelles, Belgium). *Rend. Gastroenterol.* 9(1):77-78; 1977.

3066 SERUM AND MUCOSAL GASTRIN IN NORMAL AND CHRONIC ATROPHIC GASTRITIS SUBJECTS [Abstract]. (Eng.) Marletta, F.; Catalano, F.; Scollo, L.; Blasi, A. (Cattedra di Gastroenterologia dell'Universita, Catania, Italy). *Rend. Gastroenterol.* 9(1):53; 1977.

3067 GASTRIC-STUMP GASTRITIS: CLINICAL, ENDOSCOPIC, HISTOPATHOLOGICAL AND

GASTRINAEMIC STUDY [Abstract]. (Eng.) Cacciari, C.; Malaguti, P.; Sciarretta, G.; Bovani, I.; Garagnani, B.; Franceschi, F.; Fini, A. (Ospedale Maggiore, Bologna, Italy.) *Rend. Gastroenterol.* 9(1):54-55; 1977.

3068 SERUM GASTRIN LEVELS IN CHRONIC ALCOHOLICS AND NON-ALCOHOLICS WITH AND WITHOUT GASTRITIS [Abstract]. (Eng.) Zapiach, L.; Pitchumoni, C. S.; Glass, G. B. J.; Stremple, J. (New York Medical Coll., New York, NY). *Gastroenterology* 72(5, Part 2):1153; 1977.

3069 INFLAMMATORY CELL COUNT AND IDENTIFICATION IN FUNDIC CHRONIC GASTRITIS [Abstract]. (Eng.) Giacosa, A.; Molinari, F.; Cheli, R. (Ospedale Generale Regionale, Genova, Italy). *Rend. Gastroenterol.* 9(1):50-51; 1977.

3070 INFLAMMATORY CELL COUNT AND IDENTIFICATION IN THE SUPERFICIAL EPITHELIUM OF CHRONIC GASTRITIS [Abstract]. (Eng.) Cheli, R.; Giacosa, A.; Molinari, F. (Ospedale Civili di Genova, Genova, Italy). *Rend. Gastroenterol.* 9(1):74-75; 1977.

3071 CELL PROLIFERATION KINETICS IN HUMAN GASTRIC MUCOSA [Abstract]. (Eng.) Hansen, O. H.; Larsen, J. K.; Pedersen, T.; Svendsen, L. B. (Bispebjerg Hosp., Kobenhavn, Denmark). *Rend. Gastroenterol.* 9(1):77; 1977.

3072 GIANT MUCOSAL FOLD OF THE ANTRUM (LOCALIZED MENETRIER'S DISEASE) AS A CAUSE OF RECURRENT INTESTINAL BLEEDING. (Ger.) Roth, B.; Hell, K. (Chirurgische Klinik, Kantonsspital, CH-4410 Liestal, Switzerland). *Helv. Chir. Acta* 44(1/2):193-196; 1977.

3073 INFANTILE HYPERTROPHIC PYLORIC STENOSIS DURING THE FIRST WEEK OF LIFE. APPROACHES TO DIAGNOSIS, BASED ON OBSERVATIONS OF A NEWBORN WHOSE VOMITING BEGAN ON THE FIRST DAY. (Eng.) Andrassy, R. J.; Haff, R. C.; Larsen, G. L. (U.S. Air Force Medical Center, Lackland Air Force Base, TX 78236). *Clin. Pediatr.* 16(5):475-476; 1977.

3074 PYLORIC STENOSIS FROM TUBERCULOSIS. A CASE REPORT. (Eng.) Osime, U. (Univ. Benin Teaching Hosp., Benin City, Nigeria). *J. R. Coll. Surg. Edinb.* 22(3):218-220; 1977.

3075 THE PYLORIC SEPTUM: ACQUIRED OR CONGENITAL? (Eng.) van der Reis, L.; Fisher, J. H.; Baker, M. (Mary's Help Hosp., Daly City, CA 94015). *Aust. N.Z. J. Med.* 7(3):302-303; 1977.

3076 DIAGNOSIS AND TREATMENT OF ISOLATED VARICES IN THE STOMACH [Abstract]. (Eng.) Knipper, A.; Soehendra, N.; Werner, B. (Abt. fur Allgemeinchirurgie, Chirurg. Univ.-Klinik Hamburg, Hamburg, W. Germany). *Endoscopy* 9(2):115; 1977.

3077 EFFECT OF BOMBESIN ON SERUM GASTRIN LEVELS IN Formes frustes OF THE ZOLLINGER-ELLISON SYNDROME AND IN PATIENTS WITH RETAINED ANTRUM [Abstract]. (Eng.) Speranza, V.; Basso, N.; Materia, A.; Giri, S.; Lezoche, E. (Patologia Chirurgica III dell'Universita, Roma, Italy). *Rend. Gastroenterol.* 9(1):63; 1977.

3078 DRUGS IN THE TREATMENT OF GASTRIC AND DUODENAL ULCER. (Eng.) Langman, M. J. S. (City Hosp., Univ. Nottingham, Nottingham, NG5 1PB, England). *Drugs* 14(2):105-115; 1977.

3079 CIMETIDINE AND SERUM GASTRIN: RELATIONSHIP TO ACID OUTPUT IN GASTRIC ULCER PATIENTS [Abstract]. (Eng.) Wilcox, L. L.; Englert, E., Jr.; Preston, J. W. (Univ. Utah Coll. Medicine, Salt Lake City, UT). *Gastroenterology* 72(5, Part 2):1150; 1977.

3080 THE NEED FOR DEFINITIVE THERAPY IN THE MANAGEMENT OF PERFORATED GASTRIC ULCERS [Abstract]. (Eng.) DeBoisblanc, R.; Lee, W. C.; Nance, F. C. (Louisiana State Univ. Medical Sch., New Orleans, LA). *Gastroenterology* 72(5, Part 2): 1046; 1977.

3081 THE EFFECT OF PROXIMAL GASTRIC VAGOTOMY ON ULCER HEALING. (Eng.) Liavag, I. (Aker Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 11(Suppl. 42):147-153; 1976.

3082 STUDIES ON THE PATHOGENESIS OF POSTVAGOTOMY ULCER OF THE STOMACH. (Eng.) Neki, T. (Yamaguchi Univ. Sch. Medicine, 1144 Kogushi, Nishiku, Ube, Yamaguchi, 755, Japan). *Arch. Jpn. Chir.* 46(3):226-243; 1977.

3083 DOUBLE-BLIND TRIAL COMPARING CIMETIDINE WITH CARBENOXOLONE IN THE TREATMENT OF BENIGN GASTRIC ULCER [Abstract]. (Eng.) Taylor, R. H.; Laidlow, J. M.; Chapman, R. G.; Colin-Jones, D. G.; Golding, P. L.; Hunt, R. H.; *et al.* (Central Middlesex Hosp., London, England). *Gut* 18(5): A420; 1977.

3084 EXPERIENCE WITH CIMETIDINE IN THE TREATMENT OF GASTRIC ULCERATION [Abstract]. (Eng.) Ciclitira, P. J.; Nachell, R. J.; Farthing, M. J.; Dick, A. P.; Hunter, J. O. (Addenbrooke's Hosp., Cambridge, England). *Gut* 18(5):A419; 1977.

3085 PREVENTION OF STRESS ULCER BY SOMATOSTATIN IN RATS. (Eng.) Mattes, P.; Lauterbach, H. H.; Raptis, S. (Dept. General Surgery, Univ. Ulm, Steinhovelstr. 9, D-7900 Ulm/Donau, W. Germany). *Langenbecks Arch. Chir.* 341(4):297-301; 1976.

3086 GASTRIC STRESS ULCERATIONS--A CRITICAL REAPPRAISAL OF PATHOGENESIS AND CLINICAL BASIS. (Eng.) Schwille, P. O. (Chirurgische Universitatsklinik, Krankenhausstr. 12, D-8520 Erlangen, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 24(1):55-58; 1977.

3087 DUODENOGASTRIC REFLUX AND STRESS ULCER. (Ger.) Schumpelick, V.; Rauchenberger, B. (Chirurgische Universitatsklinik, 2000 Hamburg 20, Martinistrasse 52, W. Germany). *Dtsch. Med. Wochenschr.* 101(45):1647-1649; 1976.

3088 EFFECT OF THE FUNCTIONAL AND MORPHOLOGICAL STATE OF THE STOMACH ON THE VITAMIN C BALANCE OF THE ORGANISM. (Rus.) Smoliansky, B. L. (Dnepropetrovsk Medical Inst., Dnepropetrovsk, USSR). *Vrach. Delo* (5):13-16; 1977.

3089 CIRCULATING ANTIBODIES TO CHEMICAL SUBSTANCES IN ALLERGIC DISEASES OF THE STOMACH. (Rus.) Kachalai, D. P.; Kozintseva, P. V. (All-Union Scientific Res. Inst. Hygiene Toxicology Pesticides, Polymers and Plastic Materials, Kiev, USSR). *Vrach. Delo* (11):139-142; 1976.

3090 ADJUVANT CHEMOTHERAPY WITH 5-FLUOROURACIL IN A GROUP OF PATIENTS WITH GASTRIC NEOPLASIA. (Ita.) Fraschini, P.; Labianca, R.; Montinari, F.; D'Antona, A.; Luporini, G. (Ospedale Maggiore S. Carlo Borromeo e Policlinico, Milan, Italy). *Terapia* 62(443):8-13; 1977.

3091 ROENTGENOLOGICAL CHARACTERISTICS OF ESOPHAGOJEJUNODUODENOPLASTY FOLLOWING GASTRECTOMY FOR CARCINOMA OF THE STOMACH. (Rus.) Kitaev, V. V.; Kuznetsov, N. A. (Dept. Roentgenology Radiology, I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Vestn. Rentgenol. Radiol.* (2):20-25; 1977.

3092 CLINICAL PICTURE, DIAGNOSIS AND TREATMENT OF GASTRIC CANCER WITH REGARD TO AGE. (Rus.) Sazonov, A. M.; Portnoy, L. M.; Marchenko, V. A.; Leonov, A. L.; Turovsky, B. M. (M. F. Vladimirskii Moscow Oblast Scientific Res. Inst. with Clinic, Moscow, USSR). *Sov. Med.* (2):95-100; 1977.

3093 REMOTE RESULTS OF SURGICAL TREATMENT OF GASTRIC CARCINOMA. (Rus.) Kalaida, L. P.; Dzhaubaev, M. O.; Shmatko, I. T.; Panko, P. P. (Stavropol Medical Inst., Stavropol, USSR). *Klin. Med.* 55(4):57-60; 1977.

See also, 2709, 2721, 2723, 2725, 2893, 2922, 2929, 2932, 2934, 2950, 2966, 2967, 2968, 2972, 2976, 2977, 2981, 2983, 2988, 2989, 3003, 3005, 3006, 3020, 3021, 3022, 3024, 3025, 3028, 3030, 3033, 3040, 3094, 3095, 3107, 3113, 3130, 3133, 3134, 3147, 3192, 3220, 3356, 3408, 3412, 3413, 3423, 3426, 3428, 3442, 3446, 3447, 3448, 3449, 3450, 3451, 3453.

STOMACH

Peptic Ulcers

3094 DYNAMIC ASPECTS OF GASTRIC EMPTYING IN PATIENTS WITH PEPTIC ULCER ACCORDING TO ULCER STAGES. (Eng.) Miyaoka, T.; Misaki, F.; Sasaki, Z.; Kimoto, K.; Kawai, K. (Kyoto Prefectural Univ. Medicine, Kawaramachi-Hirokoji, Kamigyo-ku, Kyoto, 602, Japan). *Digestion* 16(1/2):10-17; 1977.

To analyze the pattern of gastric emptying and to clarify the difference in the rate of emptying according to the site of peptic ulcer, the pattern and the time of gastric emptying were investigated in 38 patients with peptic ulcer and 7 healthy volunteers using the double-sampling method. The pattern of gastric emptying was exponential in 44% of the cases, quadratic in 29%, and unclassified in 27%. These patterns appeared to depend on the distance from the gastric angle to the pyloric ring measured from x-ray pictures in the upright position. There was no significant difference in the gastric emptying time in patients with peptic ulcer according to its site. During follow-up observations of the same case, the gastric emptying time had a tendency to shorten in patients with duodenal ulcer, while it showed no definite variation in patients with gastric ulcer.

3095 G-CELL COUNTS IN ANTRAL ENDOSCOPIC BIOPSIES BY IMMUNOFLUORESCENCE. (Eng.) Crivelli, O.; Pera, A.; Ferrari, A.; Rizzetto, M.; Lombardo, L.; Babando, G.; *et al.* (Ospedale Mauriziano Umberto I--Corso Turati 46, 10128 Torino, Italy). *Scand. J. Gastroenterol.* 12(6):721-726; 1977.

Antral gastrin-producing cells (G cells) were counted by an immunofluorescence technique in the antral biopsies obtained at endoscopy from 18 patients with duodenal ulcer, 17 patients with gastritis,

and 32 individuals with a normal gastric mucosa. The G-cell count was significantly lower ($p<0.01$) in patients with duodenal ulcer (142 G cells/mm^2) in comparison to normal subjects (327 G cells/mm^2). No statistically significant correlation was found between the G-cell number and any of the other parameters tested (pentagastrin test, basal serum gastrin, and its response to a standard meal). The G-cell count could be relevant in the preoperative assessment of the G-cell density in duodenal ulcer patients.

3096 ACUTE PEPTIC ULCER IN INFANCY AND CHILDHOOD. (Eng.) Grosfeld, J. L.; Shipley, F.; Fitzgerald, J. F.; Ballantine, T. V. (Indiana Univ. Sch. Medicine, Indianapolis, IN). *Am. Surg.* 44(1):13-19; 1978.

Acute peptic ulcers were studied in 29 infants and children (15 girls and 14 boys; ages 1 day to 18 yr, mean=7.2 yr). The ulcer was a solitary lesion in all but one case, occurred equally in the duodenum (15) and stomach (14), and was associated with a 14% mortality rate. Location of the ulcer was unrelated to sex and age. Associated factors observed were "ulcerogenic" medications in 12 patients (aspirin, 7; steriods, 4; lomotil, 1), postoperative condition (following ruptured appendix in 2 and Tetralogy of Fallot in 1), burns (2), hepatic coma (1), psoriasis (1), and respiratory insufficiency (1). Diagnostically, endoscopy was the most useful procedure, with angiography and upper gastrointestinal contrast studies useful in selected cases. Treatment by ligation, vagotomy, and pyloroplasty elicited good responses in complicated cases resulting in hemorrhage. Lesser operations occasionally resulted in recurrence. Preventative measures, including postoperative and post-trauma antacid therapy in high-risk patients, are recommended, as they are preferable to any treatment course.

3097 TREATMENT OF PEPTIC ULCER DISEASE IN THE RENAL TRANSPLANT PATIENT. (Eng.) Owens, M. L.; Passaro, E., Jr.; Wilson, S. E.; Gordon, H. E. (Veterans Admin. Wadsworth Hosp. Center, Wilshire and Sawtelle Blvd., Los Angeles, CA). *Ann. Surg.* 186(1):17-21; 1977.

Previous reports of peptic ulcer disease in kidney transplant recipients are reviewed. In addition, the authors' experience with 21 cases, occurring in 115 renal transplant patients, is presented. Between 1968 and 1976, 12 transplant centers reported on gastrointestinal complications occurring in 1,853 renal transplant recipients. Among these are 52 patients in whom peptic ulcers developed before transplantation and 72 patients in whom peptic ulcers developed after transplantation. Patients who were operated on for peptic ulcer before transplant were compared with patients with peptic ulcer before transplant but who were not operated on. Ulcer recurrence was significantly lower in the operated group ($p<0.0003$). Following transplantation, 59 of 68 patients with peptic ulcer disease presented with bleeding or perforation. There were 31 deaths in 72 patients. Symptoms usually occurred early, 74% in 6 months, but 19% occurred after 1 yr. The mortality from duodenal, gastric, combined gastric and duodenal, and recurrent ulcers did not differ significantly. Elective surgery is indicated for peptic ulcer when demonstrated before or after kidney transplantation.

3098 EVALUATION OF CARBENOXOLONE SODIUM IN THE TREATMENT OF DUODENAL ULCER. (Eng.) Nagy, G. S. (14 Marshall Ave., St. Leonards, New South Wales, Australia). *Gastroenterology* 74(1):7-10; 1978.

The healing of duodenal ulcers over a 6-week period was assessed endoscopically in a double blind trial involving 21 patients on carbenoxolone and 23 patients on placebo. The two groups were adequately matched, with the exception that larger ulcers predominated in the carbenoxolone group (there were 15 patients with ulcers >1 cm in the carbenoxolone group, versus 9 in the placebo group). Relief of symptoms showed poor correlation with ulcer healing. Fourteen of the 21 patients in the carbenoxolone group and 7 of the 23 in the placebo group showed endoscopic evidence of complete healing. The result is highly significant ($p<0.016$) and confirms the therapeutic efficacy of carbenoxolone sodium positioned-release capsules in the treatment of duodenal ulcers. Side-effects of carbenoxolone therapy in the form of weight gain, rise in diastolic blood pressure, and hypokalemia were observed, but with adequate monitoring and appropriate countermeasures, no patient suffered any ill effects.

3099 ULTRASTRUCTURE OF DUODENAL EPITHELIAL CELLS IN PATIENTS WITH ACTIVE DUODENAL ULCERS AND AFTER TREATMENT WITH CIMETIDINE. (Eng.) Pillay, C. V.; Moshal, M. G.; Bryer, J. V.; Booyens, J. (Dept. Physiology, Univ. Durban-Westville, Durban, South Africa). *S. Afr. Med. J.* 52(27):1082-1085; 1977.

Comparative ultrastructural studies were carried out in biopsy specimens taken under direct vision by endoscopy from the normal duodenum, from the edge of deep and flat duodenal ulcers, and from areas 1 cm away from such ulcers. In addition, the ultrastructure of biopsy tissue from the scar of ulcers that healed after 6 weeks' therapy with cimetidine was studied. Tissue from the edge of both flat and deep duodenal ulcers showed gross pathological changes, particularly with regard to microvilli. Cells from the edge of deep ulcers showed increased secretory activity. Epithelial tissue 1 cm from flat duodenal ulcers exhibited ultrastructural changes more severe than cells 1 cm from deep duodenal ulcers. The epithelial tissue from the scar area after 6 weeks' treatment appeared capable of regaining a fully functional role, although it was abnormal (irregularly shaped microvilli) in some specimens.

3100 EFFECT OF LOW-DOSE PROPANTHELINE ON FOOD-STIMULATED GASTRIC ACID SECRETION: COM-

PARISON WITH AN "OPTIMAL EFFECTIVE DOSE" AND INTERACTION WITH CIMETIDINE. (Eng.) Feldman, M.; Richardson, C. T.; Peterson, W. L.; Walsh, J. H.; Fordtran, J. S. (Veterans Admin. Hosp., 4500 S. Lancaster Rd., Dallas, TX 75216). *N. Engl. J. Med.* 297 (26):1427-1430; 1977.

The widely held notion that anticholinergic drugs must be used in near toxic doses to inhibit gastric acid secretion effectively was re-examined, and the effect of a small dose of an anticholinergic on the inhibitory effect of an H_2-receptor antagonist was investigated. Nine patients with duodenal ulcer were studied after a low dose (15 mg) and after a near toxic dose (averaging 48 mg) of propantheline. The mean inhibition of food-stimulated acid secretion was identical with the two doses of propantheline (29 ± 10 and 29 ± 11%, resp). In addition, when 15 mg of propantheline were combined with cimetidine (300 mg), acid secretion was suppressed to a greater degree than with either drug alone. A low dose of propantheline is as effective as a near toxic dose in suppressing food-stimulated acid secretion and augments the inhibitory effect of cimetidine.

3101 EVALUATION OF DUOGASTROME (CARBENOXOLONE SODIUM) FOR THE TREATMENT OF DUODENAL ULCER: A MULTICENTRE STUDY. (Eng.) Archambault, A.; Farley, A.; Gosselin, D.; Martin, F.; Birkett, J. P. (Centre de gastro-enterologie de Montreal, 235, est Dorchester, Ste 101, Montreal, Quebec H2X 1N8, Canada). *Can. Med. Assoc. J.* 117(10): 1155-1159; 1977.

A double-blind study of the effectiveness of carbenoxolone sodium was carried out in 152 duodenal ulcer patients. Seventy-six patients received carbenoxolone sodium capsules (50 mg, q.i.d.), and 76 received placebo capsules (q.i.d.) for 6 weeks. Evaluation of the efficacy of carbenoxolone therapy was based on data from 119/152 patients (59 test subjects and 60 controls). The ulcers healed completely (as assessed by either endoscopy or roentgenography) in 44/59 of the patients treated with carbenoxolone and in 29/60 of those treated with placebo ($p<0.01$). The proportions were similar if only endoscopical assessments are considered: 32/42 and 26/47, resp. Minor side-effects (weight gain, edema, mild hypokalemia, increase in blood pressure, and slight increases in serum concentrations of lactic dehydrogenase and alkaline phosphatase) were noted in the carbenoxolone-treated patients. Although these side-effects were not serious, close clinical monitoring by weekly visits to their physician is recommended for every patient undergoing carbenoxolone therapy, at least during the first month.

3102 EFFECT OF SOMATOSTATIN ON MEAL-INDUCED GASTRIC SECRETION IN DUODENAL ULCER PATIENTS. (Eng.) Konturek, S. J.; Swierczek, J.; Kwiecien, N.; Mikos, E.; Oleksy, J.; Wierzbicki, Z. (Inst. Physiology, 16 Grzegorzecka St., 31-531 Krakow, Poland). *Am. J. Dig. Dis.* 22(11):981-988; 1977.

The effect of somatostatin (GH-RIH) on basal and meal-, pentagastrin-, or histamine-stimulated gastric acid and pepsin secretion was studied in six duodenal ulcer patients. Pentagastrin and histamine were infused i.v. at 2 and 25 μg/kg/hr, resp. The i.v. infusion of GH-RIH in graded doses ranging from 0.62 to 5.0 μg/kg/hr produced a dose-related inhibition of pentagastrin-induced acid secretion, reaching about 15% of control level at the dose of 5.0 μg/kg/hr. Acid inhibition was paralleled by a decrease in the pepsin output and accompanied by a dose-dependent reduction in serum growth hormone and insulin levels measured by radioimmunoassay. GH-RIH used in a single dose of 2.5 μg/kg/hr produced about 85% inhibition of acid secretion induced by a meal (measured by intragastric titration) accompanied by a significant decrease in serum gastrin and insulin levels. The effect of GH-RIH on histamine-stimulated secretion was very modest and observed only after stopping the GH-RIH infusion. Thus, GH-RIH suppresses acid and pepsin secretion induced by pentagastrin and a meal, and this effect is accompanied by a suppression of serum growth hormone and gastrin levels, which may contribute to the observed inhibition of gastric secretion.

3103 INHIBITION OF GASTRIN SECRETION BY SULPIRIDE TREATMENT IN DUODENAL ULCER PATIENTS. (Eng.) Caldara, R.; Romussi, M.; Ferrari, C. (Fatebenefratelli Hosp., 23 Corso di Porta Nuova, 20121 Milano, Italy). *Gastroenterology* 74(2, Part 1): 221-223; 1978.

The serum gastrin response to whole beef extract was measured in 14 duodenal ulcer patients before and after sulpiride administration (100 mg). A significant inhibition of response was found both after acute i.m. injection of the drug and after p.o. administration for 1 week (100 mg/8 hr). Fasting serum gastrin was also significantly reduced after chronic treatment; gastric acid secretion did not change. Although the mechanism of the gastrin-lowering action of sulpiride is unknown, it could be mediated by some known effect(s) of the drug, such as modifications in brain monoamine metabolism or perhaps reduced growth hormone secretion.

3104 EFFECT OF VARIOUS PYLOROPLASTIES ON FECAL FAT EXCRETION IN DOGS AND HUMANS. (Eng.) Wastell, C.; Ellis, H. (Westminster Hosp., St. Johns Gardens, London SW1P 2AP, England). *Am. J. Dig. Dis.* 23(1):45-50; 1978.

Fecal fat excretion was measured both before and after truncal vagotomy and pyloroplasty in 25 patients with chronic duodenal ulcer and in dogs before and after pyloroplasty alone. In 13 patients, the mean increase in fecal fat after truncal vagotomy and Heineke-Mikulicz pyloroplasty was 2.34 g/24 hr. After truncal vagotomy and Finney pyloroplasty in 12 patients, the increase was similar (3.09 g/24 hr). Fecal fat was also measured before and after a 3-cm, a 6-cm Heineke-Mikulicz, and a Finney type of pyloroplasty in dogs. The area resulting from the pyloroplasties was measured. Pyloroplasty resulted in a signifi-

cant increase in fecal fat ($0.02<p<0.05$), but no correlation was found between the magnitude of the increase and the area that resulted from the pyloroplasties. It is concluded that, when considering which type of pyloroplasty to use after either truncal or selective vagotomy, the most important considerations are technical and relate to satisfactory drainage of the antrum.

3105 INTRINSIC FACTOR SECRETION AFTER VAGOTOMY. (Eng.) Meikle, D. D.; Bull, J.; Callender, S. T.; Truelove, S. C. (West Middlesex Hosp., Isleworth, Middlesex, England). *Br. J. Surg.* 64 (11):795-797; 1977.

To compare the effects of truncal vagotomy with highly selective vagotomy on the histological state of the gastric and duodenal mucosa, and or serum gastrin, the intrinsic factor (IF) output during basal and Histalog-stimulated gastric secretion was estimated in two series of patients with chronic duodenal ulcer before and 3 months or more after treatment by either highly selective vagotomy or truncal vagotomy and pyloroplasty. Each procedure produced significant reductions in intrinsic factor secretion after Histalog stimulation ($p<0.001$). This confirms the view expressed by previous workers that it is the vagotomy as such that is responsible for this effect, excluding the drainage procedure from any possible role. Both types of vagotomy again produced a significant reduction in IF secretion when measured 3 months or more after surgery, suggesting that the depressed IF secretion is a permanent feature and one that is postulated to become progressively more severe. In both series there was a marked reduction in IF output during the second hour of stimulated gastric secretion, indicating an early wash-out of preformed IF. This finding persisted after vagotomy.

3106 SUBGROUPS OF PEPTIC ULCER PATIENTS. (Eng.) Eckensberger, D.; Overbeck, G.; Biebl, W. (Zentrum fur Psychosomatische Medizin an der Universitat Giessen Abt. Medizinische Soziologie, Ludwigstr. 50, 6300 Giessen, W. Germany). *J. Psychosom. Res.* 20(5):485-499; 1976.

3107 HYPERGASTRINAEMIA, HYPERACIDITY AND PEPTIC ULCERATION [Abstract]. (Eng.) Hansky, J. (Dept. Medicine, Monash Univ., Melbourne, Victoria, Australia). *Rend. Gastroenterol.* 9(1):61; 1977.

3108 POTENTIATION OF MAXIMAL ACID RESPONSE IN DUODENAL ULCER SUBJECTS [Abstract]. (Eng.) Elder, J. B.; Smith, I. S. (Royal Infirmary, Manchester, England). *Eur. Surg. Res.* 8(Suppl. 2): 52-53; 1976.

3109 INTESTINAL PHASE OF GASTRIC SECRETION IN DUODENAL ULCER PATIENTS [Abstract]. (Eng.) Konturek, S. J.; Kwiecien, N.; Sito, E.; Obtulowich, W.; Oleksy, J. (Inst. Physiology, Medical Acad., Krakow, Poland). *Gastroenterology* 72(5, Part 2):1083; 1977.

3110 DISCRIMINANT FUNCTION ANALYSIS OF SUGAR AND NITROGEN DERIVATIVES OF GASTRIC JUICE IN DUODENAL ULCERATION AND X-RAY NEGATIVE DYSPEPSIA [Abstract]. (Eng.) Donaldson, J. D.; MacRae, K. D.; Parks, T. G. (Queen's Univ. Belfast, Inst. Clinical Science, Grosvenor Rd., Belfast BT12 6BJ, Northern Ireland). *Eur. Surg. Res.* 8(Suppl. 1):58; 1976.

3111 SENSITIVITY (D_{50}) OF GASTRIC ACID SECRETION TO PROTEIN MEALS AND TO GASTRIN (G17) IN DUODENAL ULCER (DU) AND NORMAL (N) SUBJECTS [Abstract]. (Eng.) Lane, W.; Hogan, D.; Isenberg, J. I.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1087; 1977.

3112 SERUM PEPSINOGEN AND GASTRIN IN CHRONIC HEMODIALYSIS PATIENTS [Abstract]. (Eng.) Mangla, J. C.; Swamy, A.; Guarasci, G.; Cestero, R. (Monroe Community Hosp., Univ. Rochester, Rochester, NY). *Gastroenterology* 72(5, Part 2):1093; 1977.

3113 PENTAGASTRIN-INDUCED ABNORMALITY OF GASTRIC EMPTYING IN GASTRIC ULCER DISEASE [Abstract]. (Eng.) Gamblin, F. T. (Uniformed Services Univ. Health Sciences, Bethesda, MD). *Gastroenterology* 72(5, Part 2):1187; 1977.

3114 FASTING AND POST-PRANDIAL PLASMA SECRETIN CONCENTRATIONS [Abstract]. (Eng.) Straus, E.; Yalow, R. S. (Veterans Admin. Hosp., Bronx, NY). *Gastroenterology* 72(5, Part 2):1183; 1977.

3115 SOMATOSTATIN-LIKE IMMUNOREACTIVITY IN THE STOMACH AND PROXIMAL DUODENUM IN CONTROLS AND PATIENTS WITH PEPTIC ULCER [Abstract]. (Eng.) Chayvialle, J. A. P.; Descos, F.; Bernard, C.; Martin, A.; Lambert, R. (INSERM, U-45, Hopital Edouard Herriot, Lyon, France). *Gastroenterology* 72(5, Part 2):1037; 1977.

3116 PERFORATED GASTRIC ULCER SECONDARY TO GALLSTONE ILEUS. (Eng.) Reed, J. E.; Beazley, W.; Oglesby, S. E. (Stuart Circle Hosp., 413-21 Stuart Circle, Richmond, VA 23220). *Va. Med.* 103(12):890-892; 1976.

3117 GASTRIC IRRADIATION OF PEPTIC ULCER: A FOURTEEN-YEAR FOLLOW-UP [Abstract]. (Eng.) Cocco, A. E.; Mendeloff, A. I. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD). *Gastroenterology* 72(5, Part 2):1039; 1977.

3118 TRI-POTASSIUM DI-CITRATO BISMUTHATE: A REPORT OF ITS PHARMACOLOGICAL PROPERTIES

AND THERAPEUTIC EFFICACY IN PEPTIC ULCER. (Eng.) Brogden, R. N.; Pinder, R. M.; Sawyer, P. R.; Speight, T. M.; Avery, G. S. (Australasian Drug Information Services, P.O. Box 34-030, Birkenhead, Auckland 10, New Zealand). *Drugs* 12(6):401-411; 1976.

3119 EFFECT OF AN ANTACID REGIMEN ON THE HEALING AND PAIN OF DUODENAL ULCER (DU). A COOPERATIVE STUDY [Abstract]. (Eng.) Peterson, W. L. (Center Ulcer Res. and Education, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1112; 1977.

3120 USEFULNESS OF ANTACID-ANTICHOLINERGIC THERAPY FOR DUODENAL ULCER [Abstract]. (Eng.) Meeroff, J. C.; Chantada, C. A.; Waciarz, M.; Marchevsky, N.; Meeroff, M. (Univ. Buenos Aires, Buenos Aires, Argentina). *Gastroenterology* 72(5, Part 2):1100; 1977.

3121 EFFECT OF NIGHTTIME ANISOTROPINE METHYL BROMIDE (AMB) ON DUODENAL ULCER (DU) HEALING: A CONTROLLED TRIAL [Abstract]. (Eng.) Bowers, J.; Forbes, J.; Freston, J. (Univ. Utah Coll. Medicine, Salt Lake City, UT). *Gastroenterology* 72(5, Part 2):1032; 1977.

3122 ACID REDUCTION BY H_2-RECEPTOR ANTAGONIST VS. NEUTRALIZING ANTACID IN DUODENAL ULCER [Abstract]. (Eng.) Deering, T. B.; McCall, J. T.; Carlson, G. L.; Malagelada, J. R. (Mayo Clinic, Rochester, MN 55901). *Gastroenterology* 72(5, Part 2):1046; 1977.

3123 HISTAMINE H_2-RECEPTOR ANTAGONISTS IN THE TREATMENT OF DUODENAL ULCERS. (Eng.) Bank, S.; Barbezat, G. O.; Novis, B. H.; Tim, L. O.; Odes, H. S.; Helman, C.; *et al.* (Groote Schuur Hosp., Cape Town, South Africa). *S. Afr. Med. J.* 50(44):1781-1784; 1976.

3124 CIMETIDINE. A REVIEW OF CLINICAL TRIALS. (Eng.) Cipolle, R. J.; Navarro, R. P.; Fischer, R. P. (St. Paul Ramsey Hosp. and Medical Center, 640 Jackson St., St. Paul, MN 55101). *Minn. Med.* 60(6):446-449; 1977.

3125 SERUM GASTRIN LEVELS BEFORE AND AFTER 6 WEEKS OF CIMETIDINE THERAPY IN PATIENTS WITH DUODENAL ULCER. (Eng.) Bank, S.; Barbezat, G. O.; Vinik, A. I.; Helman, C. (Groote Schuur Hosp., Observatory 7925, Cape Town, South Africa). *Digestion* 15(3):157-161; 1977.

3126 DOES ORAL MAGNESIUM HYDROXIDE (Mg) PREVENT THE CALCIUM CARBONATE (Ca) INDUCED ACID REBOUND IN PATIENTS WITH DUODENAL ULCER (DU) [Abstract]? (Eng.) Holtermuller, K. H. (Dept. Medicine, Mainz, W. Germany). *Gastroenterology* 72(5, Part 2):1071; 1977.

3127 EFFECT OF TRITHIOZINE ON 24-HOUR GASTRIC ACIDITY IN DUODENAL ULCER PATIENTS [Abstract]. (Eng.) Corinaldesi, R.; Miglioli, M.; Cornelli, U.; Cassadio, R.; Ricci, P.; Fabbri, R.; Barbara, L. (Cattedra di Gastroenterologia, Policlinico S. Orsola, Bologna, Italy). *Rend. Gastroenterol.* 9(1):70-71; 1977.

3128 THE EFFECT OF UROGASTRONE ON GASTRIC SECRETION AND SERUM GASTRIC CONCENTRATION IN DUODENAL ULCER PATIENTS [Abstract]. (Eng.) Koffman, C. G.; Elder, J. B.; Ganguli, P. C.; Gillespie, I. E.; Gregory, H.; Geary, C. (Royal Infirmary, Manchester, England). *Gastroenterology* 72(5, Part 2):1082; 1977.

3129 THE PLACE OF HIGHLY SELECTIVE VAGOTOMY FOR PEPTIC ULCER [Abstract]. (Eng.) Duthie, H. L.; Fussey, I. V.; Irvin, T. T. (Royal Infirmary, Sheffield, England). *Gastroenterology* 72(5, Part 2):1053; 1977.

3130 REPEATED VAGOTOMY FOR RECURRENT PEPTIC ULCER AFTER FIRST INCOMPLETE VAGOTOMY. (Eng.) Alexiu, O.; Furtunescu, B.; David, S. (Babes Hosp., Rumania). *Chir. Gastroenterol.* 10(3): 257-261; 1976.

3131 ACID SECRETION AND RECURRENCE AFTER SELECTIVE PROXIMAL VAGOTOMY WITHOUT DRAINAGE FOR DUODENAL ULCER [Abstract]. (Eng.) Liedberg, G.; Oscarson, J. (Dept. Surgery, Univ. Lund, S-221 85 Lund, Sweden). *Eur. Surg. Res.* 8(Suppl. 2):54-55; 1976.

3132 SERUM GASTRIN LEVELS, GASTRIC EMPTYING AND ACID OUTPUT BEFORE AND AFTER PROXIMAL GASTRIC VAGOTOMY (PGV) AND TRUNCAL VAGOTOMY AND ANTRECTOMY (TV+A) [Abstract]. (Eng.) Donovan, I. A.; Owens, C.; Poxon, V.; Clendinnen, B. G.; Harding, L. K.; Alexander-Williams, J. (Univ. Birmingham, AL). *Gastroenterology* 72(5, Part 2):1050; 1977.

3133 EPITHELIAL PROLIFERATION IN HUMAN FUNDIC MUCOSA AFTER ANTRECTOMY AND VAGOTOMY [Abstract]. (Eng.) Assad, R. T.; Eastwood, G. L.

(West Roxbury Veterans Admin. Hosp., Boston, MA). *Gastroenterology* 72(5, Part 2):1025; 1977.

3134 THE PYLORUS PRESERVING GASTRECTOMY: A PROSPECTIVE CLINICAL TRIAL IN THE TREATMENT OF DUODENAL ULCERATION. (Eng.) Fielding, L. P.; Hittinger, R. (St. Mary's Hosp. Medical Sch., London, England). *Chir. Gastroenterol.* 10(3):251-255; 1976.

3135 IRON METABOLISM IN PATIENTS AFTER PARTIAL GASTRECTOMY. (Pol.) Dzoga-Litwinowicz, M. (II Klinika Chirurgii Ogolnej Instytutu Chirurgii AM, ul. Prof. Z. Kieturakisa I, 80-742 Gdansk, Poland). *Wiad. Lek.* 29(22):1981-1984; 1976.

See also, 2638, 2644, 2725, 2955, 2966, 2981, 2983, 2988, 3004, 3007, 3057, 3060, 3078, 3081, 3084, 3164, 3413, 3425, 3428.

SMALL INTESTINE

3136 ALPHA HEAVY-CHAIN DISEASE IN SOUTHERN IRAN. (Eng.) Haghshenass, M.; Haghighi, P.; Abadi, P.; Kharazmi, A.; Gerami, C.; Nasr, K. (Pahlavi Univ. Sch. Medicine, Shiraz, Iran). *Am. J. Dig. Dis.* 22(10):866-873; 1977.

A prospective study of 32 patients in Southern Iran with primary upper small intestinal lymphoma revealed 10 cases of alpha heavy-chain disease. Patients were mostly in the second and third decades of life, and the male-female ratio was 4:1. Weight loss, diarrhea, and abdominal pain were the most common complaints, and clubbing was the most frequent physical finding. Laboratory tests revealed a malabsorption pattern on intestinal x-rays, and malabsorption of xylose, fat, and vitamin B_{12} was frequently noted. Dense plasmacytic infiltrate of the lamina propria of the small bowel was the most frequent pathologic finding, while true neoplasm of the lymphoid system (i.e., immunoblastic sarcoma) was encountered in 20% of the cases.

3137 PRODUCTION OF VITAMIN B12 ANALOGUES IN PATIENTS WITH SMALL-BOWEL BACTERIAL OVERGROWTH. (Eng.) Brandt, L. J.; Bernstein, L. H.; Wagle, A. (Montefiore Hosp. and Medical Center, 111 East 210th St., Bronx, NY 10467). *Ann. Intern. Med.* 87(5):546-551; 1977.

The presence of vitamin B12 analogues (cobamides) and the bacterial conversion of ^{57}Co-B12 (vitamin B12 cyanocobalamin, [^{57}Co]CN-Cbl) into cobamides in the intestinal contents were investigated in four patients with bacterial overgrowth. The (^{57}Co)-CN-Cbl bound to intrinsic factor was given p.o. Jejunal contents were aspirated for 24 hr and cultured aerobically and anaerobically. The CN-Cbl and cobamides were separated by electrophoresis and chromatography and identified by bioautography. Radioactivity of cobamide zones from duplicate chromatograms showed bacterial conversion of (^{57}Co)-CN-Cbl into cobamides. Cobamides ([Ade]CNCba, [2-Me Ade]CNCba, $[CN]_2$Cbi, and factor E) were found in the intestinal contents in three of the four patients, and in two of three patients cobamides represented more than 25% of the administered CN-Cbl. Thus, bacterial production of cobamides, both *de novo* and from ingested CN-Cbl bound to intrinsic factor, occurs in humans with bacterial overgrowth and results in a significant loss of vitamin B12 to the host.

3138 THE CONSEQUENCES OF SMALL INTESTINAL RESECTION. (Eng.) Compston, J. E.; Creamer, B. (St. Thomas' Hosp., London, SE1, England). *Q. J. Med.* 46(184):485-497; 1977.

Forty-three patients who underwent resection of part of the small intestine were followed at a combined medical and surgical outpatient clinic. Thirty-eight patients had Crohn's disease, and in 11 patients the disease was active at the time of the study. The length of small intestine resected was 15-194 cm in the 30 patients in which this was documented. Some colon had also been resected in 41 patients. Codeine phosphate or Lomotil (diphenoxylate hydrochloride plus atropine) and dietary fat restriction were effective in controlling diarrhea in most patients, although none reached the desired target of 40 g of fat a day. Approximately half of the patients were at or above their ideal weight. Patients with active disease required more drug therapy than those without, but otherwise they were very similar. The mean hemoglobin and serum albumin levels were normal and did not differ significantly from those without active disease. Only five patients were unable to work full-time because of illness. Six patients had histological evidence of osteomalacia, one developed night blindness due to vitamin A deficiency, and vitamin K deficiency developed suddenly in one other patient. Megaloblastic anemia due to folic acid deficiency occurred in one patient who had undergone jejunal resection. It is concluded that the prognosis of patients following small bowel resection is good, even when resection has been extensive and active disease remains, provided that specific deficiencies are promptly diagnosed and treated. The length of

small intestine remaining after resection seems to be unimportant in determining prognosis.

3139 OSTEOMALACIA AFTER SMALL-INTESTINAL RESECTION. (Eng.) Compston, J. E.; Ayers, A. B.; Horton, L. W. L.; Tighe, J. R.; Creamer, B. (St. Thomas' Hosp., London, SE1, England). *Lancet* 1(8054):9-12; 1978.

The prevalence of histological osteomalacia and its relationship to clinical, biochemical, and radiological variables was studied in 25 patients with small intestinal resection, and the response of 4 patients to vitamin D therapy was examined. Nine patients had osteomalacia, which was severe in five and mild in four. The serum alkaline phosphatase concentration was raised in all patients with severe osteomalacia, but serum calcium, phosphate, and alkaline phosphatase concentrations were normal in the four patients with mild disease, two of whom had symptoms. Osteomalacia was diagnosed radiologically in only three patients. Osteomalacia appears to be more common in patients with small intestinal resection than has previously been thought, and bone biopsy is essential if all cases are to be detected. High-dose parenteral (i.m.) vitamin D therapy was successful in two of three patients treated for 1 yr. The remaining patient and another patient were treated with p.o. 1α-hydroxyvitamin D_3; bone histology and biochemistry returned to normal after 6 months in both cases.

3140 SUCCESSFUL REVASCULARIZATION OF MESENTERIC INFARCTION FOLLOWING AORTOGRAPHY. (Eng.) Summer, D. S. (St. John's Hosp., Room 292, Springfield, IL 62702). *Ann. Surg.* 43(11):743-750; 1977.

Two cases of bowel infarction following abdominal aortography are presented. In both patients, a 57-yr-old man and a 47-yr-old woman, two of the three major arteries supplying the bowel were occluded before the study. The superior mesenteric artery in one and the inferior mesenteric artery in the other were the only arteries supplying the bowel, and their lumens were reduced. After the aortogram, the residual lumen clotted, leading to bowel necrosis. Both patients survived following revascularization of the superior mesenteric artery and necrotic bowel resection.

3141 "MEDITERRANEAN ABDOMINAL LYMPHOMA," OR IMMUNOPROLIFERATIVE SMALL INTESTINAL DISEASE. PART I: CLINICAL ASPECTS. (Eng.) Salem, P. A.; Nassar, V. H.; Shahid, M. J.; Hajj, A. A.; Alami, S. Y.; Balikian, J. B.; *et al.* (American Univ. Beirut Hosp., Beirut, Lebanon). *Cancer* 40(6):2941-2947; 1977.

Twenty-five cases in one hospital of "Mediterranean abdominal lymphoma," better known as immunoproliferative small intestinal disease (IPSID) are reported. All patients were Moslem Arabs from low socioeconomic background. The mean age was 25 yr. IPSID was shown to be a distinct disease entity characterized by a triad of clinical, pathological, and immunoglobulin abnormalities. The clinical manifestations of the disease included chronic diarrhea, weight loss, diffuse abdominal pain, finger and toe clubbing, and occasionally palpable peripheral lymph nodes. Radiological studies revealed a malabsorption pattern with evidence of mucosal fold thickening, segmentation, and flocculation of barium. Laboratory investigations showed evidence of malabsorption, hypoalbuminemia, and hypocalcemia. Two patients had no evidence of malabsorption. Nine patients had serum alpha heavy chain protein. However, intestinal fluid immunoelectropheresis and immunofluorescence studies on involved intestinal mucosa were not performed, and alpha heavy chain disease (αHCD) thus could not be excluded in the remaining 16 patients. A new staging classification is proposed, and the role of laparotomy in staging is emphasized. In five patients, mesenteric lymph nodes harbored immunoblastic sarcoma; in the same patients, a benign-appearing lymphoplasmacytic cellular infiltrate was present in the intestinal mucosa. Three patients had histologically proven lymphoma in the peripheral lymph nodes, and all had αHCD. Lymphomatous involvement of distant organs was not observed. One patient with αHCD was considered to be in the premalignant phase of IPSID. The prognosis was poor, as the majority of patients succumbed within 2 yr after diagnosis. The significance of early detection is emphasized.

3142 THE EFFECT OF JEJUNOILEAL BYPASS ON BILE COMPOSITION AND THE FORMATION OF BILIARY CALCULI. (Eng.) Wise, L.; Stein, T. (Long Island Jewish-Hillside Medical Center, New Hyde Park, NY 11040). *Ann. Surg.* 187(1):57-62; 1978.

The effect of jejunoileal bypass on the incidence of gallstone formation, on the frequency of cholesterol saturation, and on biliary lipid composition was investigated in 101 morbidly obese patients. Nine patients developed biliary calculi postoperatively during a mean follow-up period of 29.6 months. In eight consecutive patients, the lithogenicity of bile was assessed by methods that are dependent on cholesterol saturation. Postoperatively, the lithogenic score decreased in six and increased in two patients, one of whom developed gallstones. The biliary glycine/taurine ratio increased ($p<0.05$) from 4.6 to 5.9 postoperatively. These results suggest that the increased incidence of cholelithiasis following small bowel bypass is not only due to a relative change in bile composition but is probably more significantly due to an increase in the biliary glycine/taurine ratio and a consequent decrease in the biliary zeta potential.

3143 HEPATIC INTRAMITOCHONDRIAL FILAMENTS IN MORBIDLY OBESE PATIENTS UNDERGOING INTESTINAL BYPASS. (Eng.) Friedman, H. I.; Chandler, J. G.; Nemeth, T. J. (Letterman Army Inst. Res., Presidio of San Francisco, San Francisco, CA 94129). *Gastroenterology* 73(6):1353-1361; 1977.

To determine whether the presence of hepatocyte intramitochondrial filaments (IMFs) indicate a mitochondrial response to an altered cellular metabolic environment, the characteristics of these filaments were studied in 16 patients undergoing jejunal ileal bypass for morbid obesity. At the time of bypass, all of the liver biopsies showed varying degrees of steatosis, and IMFs were present in 13 of the 16 operative specimens. The IMFs were most prominent in the periportal cells, whereas the intracellular lipid was concentrated in centrilobular cells. Midzonal hepatocytes were intermediate in both respects. The IMFs were more abundant in biopsies showing moderate steatosis than in those with marked lipid accumulation in which the IMFs were limited to hepatocytes in juxtaposition to portal triads. The IMFs appeared to originate from mitochondrial cristae. When steatosis resolved 12 to 18 months after intestinal bypass, the prevalence of IMFs diminished also. The presence of IMFs may be ultrastructural evidence of an adaption to an altered metabolic environment, which resolves when the inciting influence is removed.

3144 ROLE OF CALORIC INTAKE IN THE WEIGHT LOSS AFTER JEJUNOILEAL BYPASS FOR OBESITY. (Eng.) Condon, S. C.; Janes, N. J.; Wise, L.; Alpers, D. H. (Washington Univ. Sch. Medicine, St. Louis, MO 63110). *Gastroenterology* 74(1):34-37; 1978.

To investigate the role of decreased caloric intake in the weight loss observed in patients after jejunoileal bypass for obesity, 65 patients were studied prospectively after this procedure. Dietary intake pre- and postoperatively was measured either directly by weighing food or by a research dietary history. Of 65 measurements, 59 were made at least 6 months after operation, when, over 75% of weight loss had been achieved. Fat absorption was measured in 42 patients. The entire group ate fewer calories (2,595 ± 135 cal) postoperatively than preoperatively (3,261 ± 138 cal). This difference was highly significant ($p<0.001$). Forty-eight patients ate less after their operation. The caloric deficit calculated from the observed weight loss could be accounted for entirely by the estimated decrease in intake in 22 of the 48 patients who ate less postoperatively. Moreover, measured fat malabsorption accounted for only 31% of the observed weight loss in those who ate more postoperatively and 21% in those who ate less. It is concluded that a decrease in caloric intake, along with malabsorption, is an important factor in the long term postoperative weight loss (1-9 months) after jejunoileal bypass for obesity.

3145 ABSENCE OF MUCOSAL ATROPHY IN HUMAN SMALL INTESTINE AFTER PROLONGED ISOLATION. (Eng.) Tompkins, R. K.; Waisman, J.; Watt, C. M. H.; Corlin, R.; Keith, R. (Univ. California Los Angeles Sch. Medicine, Los Angeles, CA 90024). *Gastroenterology* 73(6):1406-1409; 1977.

Segments of isolated human jejunum (bypassed for 3.33 yr in treatment of morbid obesity) and ileum (bypassed for 6 yr as a Thiry-Vella fistula in treatment of postsurgical fistula) were examined histologically and ultrastructurally. There was no obvious evidence of widespread mucosal atrophy in either case. These findings contrast with those reported in experimental animals and in most human patients with ileal urinary conduits, where atrophy of the isolated segment is the rule. Nonluminal factors in humans may be sufficient to maintain small intestinal mucosa for long periods in the absence of intestinal chyme.

3146 IDIOPATHIC INTESTINAL PSEUDOOBSTRUCTION: RESPONSE TO DRUGS. (Eng.) Lewis, T. D.; Daniel, E. E.; Sarna, S. K.; Waterfall, W. E.; Marzio, L. (McMaster Univ. Medical Center, 4W8, 1200 Main St., West, Hamilton, Ontario L8S 4J9, Canada). *Gastroenterology* 74(1):107-111; 1978.

Intraluminal recordings of motility were made from a patient with chronic idiopathic intestinal pseudoobstruction. Contractile activity was recorded from the esophagus and duodenum with and without cholinergic stimulation. Electrical activity was recorded from the duodenum with and without cholinergic stimulation. Contractile and electrical activities were recorded from the sigmoid colon at rest and after morphine administration (5 mg, i.v.). Gastric fundic relaxation was measured during balloon distention. This patient showed abnormalities of esophageal function similar to achalasia, while gastric fundic relaxation was impaired, with a more rapid rise in pressure on distention than was seen in five normal subjects. Duodenal and colonic electrical control and response activities were present on occasion. Duodenal contractions occurred in response to both bethanechol (5 mg, s.c.) and edrophonium (6-7 mg, i.v.). Therefore, the efferent cholinergic system of the small bowel appears to be functional in this case of idiopathic intestinal pseudo-obstruction. The nonadrenergic inhibitory control of esophagus and gastric fundus appears to be functioning abnormally.

3147 POSTOPERATIVE GASTROINTESTINAL ELECTRICAL AND MECHANICAL ACTIVITIES IN A PATIENT WITH IDIOPATHIC INTESTINAL PSEUDOOBSTRUCTION. (Eng.) Sarna, S. K.; Daniel, E. E.; Waterfall, W. E.; Lewis, T. D., Marzio, L. (McMaster Univ. Medical Center, 4W8, 1200 Main St. West, Hamilton, Ontario L8S 4J9, Canada). *Gastroenterology* 74(1):112-120; 1978.

Studies were carried out, after laparotomy, *in vivo*, and *in vitro* on the stomach and small intestine of a patient with severe idiopathic intestinal pseudoobstruction. Gastrointestinal electrical activities were recorded *in vivo* for 7 days postoperatively by 10 sets of bipolar electrodes implanted seromuscularly in the jejunum on both sides of an anastomosis, and in the stomach. The jejunal electrical control activity (ECA) frequency was very low (4.75 ± 5.34 cycles/min) and highly irregular immediately postoperatively, but its frequency and regularity

improved over the next hour. Then ECA disappeared except during the occurrence of a migrating myoelectrical complex (MMC) at the recording sites. The mean duration of 28 MMCs was 5.91 ± 2.79 min. The mean interval between successive MMCs was 34.7 ± 18.9 min. Drugs like meperidine as well as small doses of prostaglandin $F_{2\alpha}$ (2.5 μg/min) initiated MMCs, whereas morphine, pentagastrin, and larger doses of prostaglandin $F_{2\alpha}$ initiated ECA with electrical response activity simultaneously at all electrodes. Feeding ice cubes or a cup of tea also induced irregular ECA with electric response activity superimposed on it. Electrical stimulation during the absence of ECA could not restore it. When ECA was present, electrical stimulation could decrease but not increase the frequency of ECA, presumably because it was maximal. *In vitro* studies on longitudinal and circular muscle strips from a segment of jejunum removed at laparotomy showed that the responses to transmural stimulation of intrinsic cholinergic or nonadrenergic inhibitory nerves and to drugs like acetylcholine, carbamoylcholine, physostigmine, serotonin, catecholamines, and ATP differed only quantitatively from responses to similar strips from normal small intestine. The total absence of ECA except during a MMC may be responsible for the motility disorder in this patient. Vagal activity may be essential for initiation of MMCs; if so, the efferent cholinergic system appeared to function. Idiopathic intestinal pseudoobstruction did not result from primary impairment of muscle contractile function, or of receptors to nerve mediator function of intrinsic cholinergic or nonadrenergic inhibitory nerves. Hyperpolarization of intestinal smooth muscle may explain the absence of ECA and most other motility abnormalities in this patient.

3148 STAGNANT LOOP SYNDROME IN PATIENTS WITH CONTINENT ILEOSTOMY (INTRA-ABDOMINAL ILEAL RESERVOIR). (Eng.) Schjonsby, H.; Halvorsen, J. F.; Hofstad, T.; Hovdenak, N. (5016 Haukeland Hosp., Norway). *Gut* 18(10):795-799; 1977.

Intestinal absorption and bacteriology of the ileal contents were compared in seven patients with continent ileostomy and seven patients with conventional ileostomy. The absorption of vitamin B_{12} was reduced in five patients with continent ileostomy and subnormal in two patients with conventional ileostomy. Steatorrhea was present in four patients with continent and one patient with conventional ileostomy. Increased concentrations of total anaerobic bacteria and *Bacteroides* were found in the ileum of the patients with continent ileostomy. After a p.o. dose of [1-^{14}C]glycocholic acid there was no difference in the fecal excretion of radioactivity, whereas the $^{14}CO_2$-expiration was increased in two patients with continent ileostomy. In four patients with continent ileostomy and malabsorption of B_{12}, there was evidence of a stagnant loop syndrome, as p.o. lincomycin treatment resulted in increased absorption of B_{12}, decreased excretion of fecal fat, and decreased concentrations of *Bacteroides* in the ileum. These studies suggest that malabsorption was caused by the stagnant loop syndrome in four of the seven patients with a continent ileostomy.

3149 THE BRUSH BORDER MEMBRANE IN HEREDITARY SUCRASE-ISOMALTASE DEFICIENCY: ABNORMAL PROTEIN PATTERN AND PRESENCE OF IMMUNOREACTIVE ENZYME. (Eng.) Freiburghaus, A. U.; Dubs, R.; Hadorn, B.; Gaze, H.; Hauri, H. P.; Gitzelmann, R. (Gastrointestinal Unit, Univ. Berne, Berne, Switzerland). *Eur. J. Clin. Invest.* 7(5):455-459; 1977.

A micromodification of the Schmitz technique for the isolation of brush border membrane fragments allowed the investigation of the molecular mechanisms responsible for hereditary sucrase-isomaltase deficiency in a child with this disorder. The method allows the analysis of membrane proteins using as little as 10 μg of protein, which permits the study of the protein composition of isolated membrane fragments, the visualization of the enzyme *in situ*, and the measurement of the total enzymatic activity in the homogenate using a single biopsy specimen. Immunoreactive enzyme was present in the intact duodenal mucosa. Polyacrylamide gel electrophoresis carried out with membrane fragments of an intestinal biopsy showed an abnormal protein band without enzyme activity. The mucosa had a relatively high residual isomaltase activity, which was recovered from the gel in a position suggesting higher than normal molecular weight. The results indicate that, in this patient, the primary structural defect was in the sucrase moiety, which was enzymatically inactive. The isomaltase subunits may have aggregated into a large molecular weight complex because of unavailability of their partners. The observation also provides evidence for separate biosynthesis of the two moieties of the sucrase-isomaltase complex.

3150 INTESTINAL HEMORRHAGE IN A WOMAN WITH VON RECKLINGHAUSEN'S DISEASE. (Dut.) Knoben, J. M. A. M.; Gossink-Schaafsma, E. H.; Vrints, L. (St. Annaziekenhuis te Geldrop, Netherlands). *Ned. Tijdskr. Geneeskd.* 120(33):409-412; 1976.

3151 SMALL INTESTINAL PERFORATION. (Pol.) Suchodolski, R.; Sereczynska, T.; Preczynska, A. (Z Oddz. Chir. Szpitala im. M. Sklodowskiej-Curie w Zgierzu, Poland). *Wiad. Lek.* 30(16):1259-1263; 1977.

3152 SMALL INTESTINAL MESENTERIC CYST COMPLICATED WITH INFLAMMATION. (Pol.) Orlowski, T.; Badowski, A.; Stanowski, E. (Z I Kliniki Chir. Instytutu Chirurgii Centrum Ksztalcenia Podyplomowego WAM, ul. Szaserow 128, 00-909, Warsaw, Poland). *Wiad. Lek.* 30(16):1297-1300; 1977.

3153 REPORT OF A CASE OF STRANGULATED PROPERITONEAL HERNIA. (Fre.) Milani, H.; Vakili, K.; Vakili, K. A. (Faculty Medicine, Natl. Univ. Iran, Teheran, Iran). *Acta Chir. Belg.* 76(5): 515-517; 1977.

3154 HYPERLIPEMIA: POSTOPERATIVE FAT EMBOLISM, WITH PSYCHIATRIC SIGNS, AND PERSISTENT LIPURIA. (Fre.) Leger, L.; Jung, F.; Soprani, A. (Hopital Cochin, 27, rue du Faubourg-Saint-Jacques, 75674 Paris Cedex 14, France). *J. Chir. (Paris)* 114(1/2):3-6; 1977.

3155 HEPATO-BILIARY-PANCREATIC SYSTEM INVOLVEMENT IN SECONDARY DUODENAL STASIS. (Rus.) Bulgakov, G. A. (Acad. Medical Science USSR, Moscow, USSR). *Vestn. Khir.* 119(9):18-21; 1977.

3156 INTESTINAL ADAPTATION. (Eng.) Skagen, D. W.; Schjonsby, H. (Medical Dept. A. Univ. Clinic, Bergen, Norway). *Acta Med. Scand.* (Suppl. 603):29-33; 1977.

3157 PATHOPHYSIOLOGY OF DISEASES INVOLVING INTESTINAL BRUSH-BORDER PROTEINS. (Eng.) Alpers, D. H.; Seetharam, B. (Washington Univ. Sch. Medicine, 660 S. Euclid, St. Louis, MO 63110). *N. Engl. J. Med.* 296(18):1047-1050; 1977.

3158 THE COLON INFLUENCES ILEAL RESECTION DIARRHEA [Abstract]. (Eng.) Mitchell, J.; Zuckerman, L.; Breuer, R. I. (Evanston Hosp., Evanston, IL). *Gastroenterology* 72(5, Part 2): 1103; 1977.

3159 EFFICACY OF LOPERAMIDE IN CONTROL OF DIARRHEA AFTER ILEAL RESECTION (IR) [Abstract]. (Eng.) Gordon, S. J.; Kinsey, M. D.; Kowlessar, O. D. (Jefferson Medical Coll., Philadelphia, PA). *Gastroenterology* 72(5, Part 2):1064; 1977.

3160 SPONTANEOUS EVACUATION OF AN INTESTINAL SEGMENT. (Eng.) Wamsteker, H. (Dept. Surgery, Ziekenhuis St. Antoniushove, Leidschendam, Netherlands). *Arch. Chir. Neerl.* 29(2):149-152; 1977.

3161 SPONTANEOUS EXPULSION OF A MIGRATING INFANTRY MISSILE IMPACTED IN THE DUODENUM AND THE COMMON BILE DUCT, 32 YEARS AFTER WOUNDING. (Eng.) Weithofer, G.; Blazek, Z.; Warm, K.; Bloch, R. (Klinik fur Verdauungs- und Stoffwechselkrankheiten, Am Weinberg 3-5, 6430 Bad Hersfeld, W. Germany). *Endoscopy* 9(2):106-109; 1977.

3162 CONGENITAL JEJUNOILEAL ATRESIA. (Eng.) Viddal, K. O.; Knutrud, O. (Natl. Hosp. Norway, Pilestredet 32, Oslo, Norway). *Z. Kinderchir.* 21(2):148-153; 1977.

3163 SMALL BOWEL INFARCTION SECONDARY TO ABNORMAL FIBRINOLYSIS: A NEW SYNDROME [Abstract]. (Eng.) Davies, R. S.; Glynn, M. F. X.; Jeejeebhoy, K. N. (Toronto General Hosp., Toronto, Canada). *Gastroenterology* 72(5, Part 2):1044; 1977.

3164 MANAGEMENT OF CARCINOID TUMORS OF THE GASTROINTESTINAL TRACT. (Eng.) Welch, J. P.; Malt, R. A. (Massachusetts General Hosp., Boston, MA). *Surg. Gynecol. Obstet.* 145(2):223-227; 1977.

3165 SMALL BOWEL PERFORATION SECONDARY TO METASTATIC CARCINOMA OF THE LUNG. (Eng.) Winchester, D. P.; Merrill, J. R.; Victor, T. A.; Scanlon, E. F. (Evanston Hosp., 2650 Ridge Ave., Evanston, IL 60201). *Cancer* 40(1):410-415; 1977.

3166 RADIOLOGICAL DIAGNOSIS OF POLYP AND CARCINOMA OF THE ILEOCECAL REGION [Abstract]. (Eng.) Funada, A.; Maruyama, M. (Cancer Inst. Hosp., Tokyo, Japan). *Gastroenterol. Jpn.* 12(1): 94; 1977.

See also, 2662, 2672, 2777, 2863, 2865, 2879, 2896, 2898, 2906, 2922, 2923, 2924, 2926, 2951, 2965, 2980, 2981, 2982, 2983, 2996, 3078, 3091, 3116, 3168, 3170, 3187, 3192, 3219, 3220, 3221, 3222, 3227, 3364, 3385, 3403, 3428, 3434, 3438, 3439, 3440, 3448, 3451, 3459, 3463.

SMALL INTESTINE

Malabsorption

3167 TEST MEAL FOR ASSESSING INTRALUMINAL PHASE OF ABSORPTION IN CHILDHOOD. (Eng.) McCollum, J. P. K.; Muller, D. P. R.; Harries, J. T. (Inst. Child Health, 30 Guilford St., London WC1N 1EH, England). *Arch. Dis. Child.* 52(11):887-889; 1977.

A modification of the Lundh test meal for assessing the intraluminal phase of absorption in childhood was validated. The liquified meal is administered by nasogastric tube and contains carbohydrate (4%) in the form of glucose, protein (4%) as comminuted chicken, and fat (4%) as corn oil. One

hundred thirty-two test meals were administered to 110 patients aged 2 weeks to 18 yr (mean age 4.3 yr). Ten children with suspected malabsorption, who were proven to be normal after extensive investigation, constituted the control group. The mean trypsin, amylase, lipase, and esterase activities in the controls were 46.4 µEq/min/ml, 34 IU/ml, 860 µEq/min/ml, and 1.6 µmol/min/ml, resp., while the levels in the cystic fibrosis patients were 2.4 µEq/min/ml, 7 µEq/min/ml, and 0.10 µmol/min/ml for trypsin, lipase, and esterase, resp. The total and individual bile salt concentrations for the controls are also presented.

3168 JEJUNAL VILLOUS ATROPHY AND GRANULOMATOUS INFLAMMATION RESPONDING TO A GLUTEN-FREE DIET. (Eng.) Bjorneklett, A.; Fausa, O.; Refsum, S. B.; Torsvik, H.; Sigstad, H. (Rikshospitalet, Arendal, Norway). *Gut* 18(10):814-816; 1977.

The case of a 48-yr-old women with intestinal malabsorption and subtotal to total jejunal villous atrophy, who also had granulomatous inflammation characterized by numerous epitheloid and giant cell granulomas in the stomach, the jejunum, and the liver, is presented. On a gluten-free diet, a complete remission was achieved that included disappearance of the granulomatous inflammation. The granulomas in this case may have been manifestations of the gluten intolerance.

3169 INTESTINAL ABSORPTIVE AND DIGESTIVE FUNCTION IN PERNICIOUS ANEMIA. (Eng.) Arvanitakis, C.; Lyford, C. L.; Folscroft, J. (Kansas Univ. Medical Center, Rainbow Blvd. at 39th St., Kansas City, KS 66103). *Am. J. Med.* 63(6):859-864; 1977.

The digestive and absorptive function of the small intestinal mucosa was examined in three patients with pernicious anemia to determine the functional correlates of the morphologic changes previously described. Digestive brush border enzymes (disaccharidases and leucyl-naphthylamidase) in jejunal biopsy specimens from the patients followed a normal distribution compared with those in 12 healthy volunteers. With the exception of one patient with mild steatorrhea, the rest of the absorption test results (serum carotene, D-xylose urinary excretion, 72-hr fecal fat, serum calcium, serum albumin, jejunal biopsy) were within the normal range. Jejunal perfusion studies, however, with glucose, sodium, and water showed intestinal secretion of sodium and water, i.e., net movement of sodium and water from the plasma to the lumen, in the presence of normal glucose absorption. Follow-up studies in two patients after treatment with vitamin B_{12} did not reveal any significant improvement in the absorption rates from the pretreatment period. This abnormality of sodium and water transport in pernicious anemia represents another intestinal defect of a systemic disease that is not corrected by vitamin B_{12} replacement therapy.

3170 SELECTIVITY OF SMALL INTESTINAL EXUDATE IN CELIAC DISEASE AND CROHN'S DISEASE. (Eng.) Kingham, J. G. C.; Loehry, C. A. (General Hosp., Southampton, SO9 4XY, England). *Am. J. Dig. Dis.* 23(1):33-38; 1978.

The small intestine exudates of three patients with celiac disease and three with proximal jejunal Crohn's disease were compared with three controls, to determine the relationship between increased intestinal permeability (manifesting itself as protein-losing enteropathy) and possible loss of selectivity with the severity of intestinal lesions. The exudates were collected by proximal small intestinal perfusion. Once a steady siphonage was established, 100 Ci ^{125}I-polyvinylpyrrolidone (PVP) was injected i.v. After 1 liter of perfusate was collected, a 10-ml blood sample was taken. Following fractionation into its different molecular weight components, PVP clearance curves for perfusate and plasma were determined. Patients with celiac disease and Crohn's disease showed a significant increase both in permeability and loss of selectivity compared to controls ($p<0.001$), the latter being more profound in celiac disease. It is hypothesized that gross abnormalities in mucosal epithelial cells lead to the increase in permeability and that thickening and functional derangement of the epithelial basement membrane is responsible for the loss of selectivity of the small intestine exudate in celiac disease.

3171 IMMUNOGLOBULINS IN THE JEJUNAL MUCOSA IN ADULT COELIAC DISEASE AND DERMATITIS HERPETIFORMIS AFTER THE REINTRODUCTION OF DIETARY GLUTEN. (Eng.) Lancaster-Smith, M.; Joyce, S.; Kumar, P. (Queen Mary's Hosp., Sidcup, Kent, England). *Gut* 18(11):887-891; 1977.

The changes in jejunal immunoglobulin production after the reintroduction of dietary gluten in treated patients with adult celiac disease (ACD) and dermatitis herpetiformis (DH) was investigated. Cells containing IgA, IgG, and IgM were measured and the distribution of extracellular and epithelial cell immunoglobulin was assessed in nine treated patients with ACD and nine with DH before and after gluten was reintroduced to the diet. Patients with ACD and DH frequently had IgM and IgG cells above the normal range even before re-exposure to gluten, although the range of IgA cells was normal. In both diseases, IgA and IgM cells increased after gluten with a proportionally greater rise in the latter, so that numbers of IgM cells, but not of IgA, exceeded the control range in all but one patient. There were increased quantities of IgA and IgM extracellularly in the lamina propria and in epithelial cells after challenge with gluten. Third component of complement was also found in some biopsies after re-exposure to gluten. These findings support the suggestion that gluten induces a humoral immunological response within the small intestinal mucosa and that both IgA and IgM systems are involved.

3172 MYOPATHY IN WHIPPLE'S DISEASE. (Eng.) Swash, M.; Schwartz, M. S.; Vandenburg, M. J.; Pollock, D. J. (London Hosp., El 1BB, England). *Gut* 18(10):800-804; 1977.

The case of a patient with Whipple's disease who developed a myopathy that improved during antibiotic therapy is reported. The muscle biopsy showed wild type 2 fiber atrophy, type 1 fiber preponderance, variability in fiber size, and changes in the myofibrillar pattern of affected fibers. Interfascicular macrophages contained PAS-positive material. With the electron microscope these macrophages contained membranous inclusions and bacillary bodies, similar to those seen in the jejunal biopsy. The histological findings in this patient demonstrate the widespread involvement that may occur in the disease, but the precise relation of the myopathy to the inclusions found in the macrophages is uncertain.

3173 PRIMARY MALABSORPTION SYNDROME IN ADULTS. (Ger.) Fric, P. (II. Forschungslaboratorium fur Gastroenterologie, Karls-Universitat, Karlovo nam. 32, 121 11 Prague 2, Czechoslovakia). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(2):59-68; 1976.

3174 EXUDATIVE ENTEROPATHIES. A GENERAL REVIEW. (Fre.) Auzerie, J.; Battin, J. (Hopital des Enfants, 168 Cours de l'Argonne, 33077 Bordeaux Cedex, France). *Med. Infant. (Paris)* 83(5):497-516; 1976.

3175 INFLUENCE OF DIFFERENT MILK PREPARATIONS ON THE FREQUENCY OF DEFECATION. CLINICAL OBSERVATION OF PERSONS WITH DIFFERENT FORMS OF MILK INTOLERANCE. (Ger.) Solc, P.; Kyral, V.; Nova, R.; Jancova, M. (Karlovarska 42, 36013 Karlovy Vary-Dalovice, Czechoslovakia). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(5/6):281-288; 1976.

3176 FOLLOW-UP OF PATIENTS WITH WHIPPLE'S DISEASE. (Ger.) Voellmy, W.; Halter, F.; Keller, M.; Zimmermann, A. (Regionalspital, CH-4900 Langenthal, Switzerland). *Z. Gastroenterol.* 14(7):729; 1976.

3177 PAINFUL AND FEBRILE PSEUDONEOPLASTIC ABDOMINAL SYNDROME: WHIPPLE'S DISEASE. REPORT OF ONE CASE. (Fre.) Chaouat, Y.; Kanovitch, B.; Rakowski, S.; Faures, B.; Benhamou, C.; Bocquet, L. (Service de Rhumatologie, Fondation A. de Rothschild, 29, rue Manin, 75019 Paris, France). *Rev. Rhum. Mal. Osteoartic.* 43(10):575-576; 1976.

3178 RATES OF DIGESTION AND ABSORPTION OF DI- AND MONOSACCHARIDES IN INFANTS WITH MALABSORPTION SYNDROMES [Abstract]. (Eng.) Beyreiss, K.; Hoepffner, W.; Muller, F.; Scheerschmidt, G. (No affiliation given). *Acta Paediatr. Belg.* 29(2): 130-131; 1976.

See also, 2949, 2950, 2997, 2998, 2999, 3135, 3139, 3156, 3215, 3218, 3220, 3224, 3228, 3403, 3408, 3414, 3415, 3416, 3417, 3432, 3440.

LARGE INTESTINE

3179 FECAL MICROBIAL FLORA IN SEVENTH DAY ADVENTIST POPULATIONS AND CONTROL SUBJECTS. (Eng.) Finegold, S. M.; Sutter, V. L.; Sugihara, P. T.; Elder, H. A.; Lehmann, S. M.; Phillips, R. L. (Wadsworth Hosp. Center, Veterans Admin., Los Angeles, CA 90073). *Am. J. Clin. Nutr.* 30(11): 1781-1792; 1977.

Because colon cancer has been associated with high fat and animal protein in the diet and because the incidence of colon cancer in Seventh Day Adventists is known to be 60-70% of that in the general population, fecal flora were studied in 13 vegetarian Seventh Day Adventists and nonvegetarian Adventists. A separate study on fecal *Clostridium paraputrificum* involved a comparison of vegetarian Adventists (45) and non-Adventists on a conventional American diet (31). The Adventist groups had significantly fewer C. *septicum* and C. *tertium* isolates than the non-Adventists. Comparison with earlier diet studies revealed certain striking differences. Fusobacterium and C. *perfringens* counts were very low and lactobacillus counts very high in Adventists as compared with Japanese-Americans on either a Japanese or Western diet or Caucasian individuals on a conventional U.S. diet. Comparison of nonvegetarian Adventists with the other groups on a nonvegetarian Western diet also revealed several statistically significant differences. Finally, there were a number of significant differences in fecal flora when high risk groups (Japanese-Americans on Western Diet and Caucasians on conventional U.S. diet) were compared with low risk groups (Japanese-Americans on a Japanese diet and Adventists).

3180 COLORECTAL COMPLICATIONS OF RENAL ALLOGRAFT TRANSPLANTATION. (Eng.) Sawyerr, O. I.; Garvin, P. J.; Codd, J. E.; Graff, R. J.;

Newton, W. T.; Willman, V. L. (Dept. Surgery, St. Louis Univ., 1325 S. Grand Blvd., St. Louis, MO 63104). *Arch. Surg.* 113(1):84-86; 1978.

The cases of 113 patients with end-stage renal disease who underwent renal transplantation were reviewed to elucidate the incidence of colorectal complications and to determine the clinical course and outcome of these patients. One hundred twenty-five renal transplantations were performed in these patients between January 1968 and December 1975. Six patients had colorectal complications, and five of these patients died as a direct result. Chart analysis of these 113 transplant recipients identified 55 patients as having undergone colonic evaluation (contrast enema, postmortem examination). Seven of these 55 were found to have diverticulosis, and major colonic complications eventually developed in 4. Since the mortality from the complications of colorectal disease in immunosuppressed patients is so prohibitive, consideration should be given to exclusion from transplantation or to elective segmental colectomy prior to transplantation, regarding patients with diverticulosis and a previous history suggestive of diverticulitis.

3181 ADJUVANT LIVER PERFUSION IN COLORECTAL CANCER: INITIAL RESULTS OF A CLINICAL TRIAL. (Eng.) Taylor, I.; Brooman, P.; Rowling, J. T. (Univ. Dept. Surgery, Liverpool L69 3BX, England). *Br. Med. J.* 2(6098):1320-1322; 1977.

Fifty consecutive patients with colorectal cancer but no evidence of secondary deposits in the liver were included in an ongoing controlled clinical trial of adjuvant liver perfusion with fluorouracil aimed at reducing the incidence of hepatic metastases. All patients underwent resection of the primary tumor. Twenty-six patients served as controls, and 24 received fluorouracil (1 g/day) as a continuous infusion into the portal venous system during the first 7 days after operation. The patients were matched for age, sex, and site and stage of the disease. The immediate postoperative mortality and morbidity did not differ significantly between the two groups. During the follow-up period (mean duration 15.5 months), however, six deaths occurred in the control group and only one in the perfusion group. At necropsy, four of the controls had multiple liver metastases. Two of the surviving controls developed evidence of liver metastases, and two had a local recurrence. No patient in the perfusion group developed evidence of hepatic metastases. These initial results suggest that adjuvant portal venous perfusion with fluorouracil may reduce the incidence of liver metastases in colorectal cancer.

3182 CHEMOTHERAPY AS AN ADJUVANT TO SURGERY FOR COLORECTAL CANCER: A FOLLOW-UP REPORT. (Eng.) Lawrence, W., Jr.; Terz, J. J.; Horsley, J. S., III; Brown, P. W.; Romero, C. (Medical Coll. Virginia, Box 11, 1200 E. Broad St., Richmond, VA 23298). *Arch. Surg.* 113(2):164-168; 1978.

The results of an adjuvant program of fluorouracil for patients undergoing "curative" resection for adenocarcinoma of the colon and rectum that was initiated as a randomized clinical trial in January 1968 are presented. Patients were randomly assigned to an intraluminal fluorouracil or intraluminal control (saline) group and were so treated at the time of surgical resection, if findings at operation indicated that all gross neoplastic disease could be resected. Those patients receiving intraluminal fluorouracil (30 mg/kg) received 1.v. fluorouracil (10 mg/kg) on each of the first 2 postoperative days and five subsequent postoperative courses of p.o. fluorouracil (90 mg/kg) in each 18-day course over a 1-yr period. By July 1, 1975, there were 203 patients undergoing curative resection entered into the study. Survival and disease-free data, as of December 31, 1976, revealed no benefit from this adjuvant course of fluorouracil. These data support the need for continued randomized clinical trials of new and innovative adjuvant therapy compared with an untreated control group.

3183 ENTEROGLUCAGON AND SUBSTANCE P-LIKE IMMUNOREACTIVITY IN ARGENTAFFIN AND ARGYROPHIL RECTAL CARCINOIDS. (Eng.) Wilander, E.; Portela-Gomes, G.; Grimelius, L.; Lundqvist, G.; Skoog, V. (Univ. Hosp., P.O. Box 553, S-751 22 Uppsala, Sweden). *Virchows Arch.* [*Cell Pathol.*] 25(2):117-124; 1977.

The occurrence of substance P and enteroglucagon immunoreactivity was studied in rectal carcinoid specimens. A specific immunofluorescence for enteroglucagon or substance P or for both hormones was demonstrated in 9 of the 12 examined rectal carcinoids. One tumor was argentaffin, contained ultrastructurally pleomorphic granules of the enterochromaffin cell type, and showed immunofluorescence for substance P. The rest were nonargentaffin but were argyrophil with the Grimelius technique and contained round granules. The argyrophil carcinoids were immunoreactive to one or both hormones in eight cases and not fluorescent in three cases. In two of the nonargentaffin carcinoids, a small number of argyrophil cells was found with the Sevier-Munger method. The fact that substance P immunofluorescence is found in nonargentaffin carcinoids indicates that this substance can be produced in nonargentaffin endocrine cells or that the tumor cells of carcinoids have the potential to differentiate in several directions, with hormone production different from that of normal endocrine cells.

3184 HEREDITARY PROXIMAL COLONIC CANCER. (Eng.) Lynch, P. M.; Lynch, H. T.; Harris, R. E. (Creighton Univ. Sch. Medicine, 2500 California St., Omaha, NB 68178). *Dis. Colon Rectum* 20(8):661-668; 1977.

Ten families prone to cancer of the colon (in the absence of familial polyposis coli) were investigated to document the site distribution of colonic cancers. A significantly greater frequency of

carcinomas of the proximal colon was evident relative to nonfamilial colonic cancers (65% versus less than 35%, p<0.001). Moreover, family members with proximal colonic cancers experienced significantly enhanced survival, compared with family members with distal colonic or rectal cancers (68% versus 38%, p<0.01). Findings consistent with a genetic predisposition included early mean age at onset (45 yr) and a high frequency (40%) of multiple primary cancers in the patients studied. The results are in accord with reported findings in 11 similar kindreds from the literature, and strongly suggest the existence of a heritable variety of colonic cancer in which the proximal colon is at particularly high risk. Extraordinary early diagnostic measures, including colonoscopy, are indicated for members of such families.

3185 NONSPECIFIC PROCTITIS IN ASSOCIATION WITH IRRITABLE COLON SYNDROME. (Eng.) Tandon, R. K.; Tandon, H. D.; Tandon, B. N. (All-India Inst. Medical Sciences, Ansari Nagar, New Delhi-110016, India). *Am. J. Proctol.* 28(6):29-35; 1977.

Sixty-four patients (male:female ratio=3:1) with nonspecific proctitis associated with irritable colon syndrome were studied. The lesion was limited to 1-2 cm of the terminal rectum, and a clear cut upper border was lacking. The affected mucosa appeared congested, with occasional excoriations or petechiae but was not friable and could not be scraped off. The most common symptoms were tenesmus (93.7%) and rectal urgency (81.2%). Streaking of stool with fresh blood was common (39.1%). No correlation could be made between the different grades of proctoscopic change and the severity or duration of symptoms. Seventeen rectal biopsies were examined histologically. The glands were irregular in their axial distribution, spacing, and size and in the types of cells constituting them. The appearance of the goblet cells suggested regenerative activity following mucosal erosion. There was also severe patchy mucosal edema, congestion and interstitial hemorrhage. There was no cryptitis or crypt abscess, no active mucosal ulceration, and no Paneth cell metaplasia. No known single parasite was detected in any significant number of the patients. The condition responded well to local fomentation, topical anesthetics, and correction of the bowel disturbances. It is likely that the localized, nonspecific inflammatory condition of the anorectal region in these patients may be producing increased colonic motility and thus perpetuating the problem of irritable colon.

3186 HEREDITARY POLYPOSIS COLI I: THE DIAGNOSTIC VALUE OF COLONOSCOPY, BARIUM ENEMA, AND FECAL OCCULT BLOOD. (Eng.) Pavlides, G. P.; Milligan, F. D.; Clarke, D. N.; Cohen, S. B.; Wennstrom, C. J.; Burbige, E. J.; *et al.* (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD). *Cancer* 40(5, Suppl.): 2632-2639; 1977.

The diagnostic value of colonoscopy, barium enema, and the determination of fecal occult blood in patients at risk for hereditary polyposis coli was assessed in 225 patients from 157 families in whom polyposis had been diagnosed. There were 42 positive colonoscopies and 12 positive barium enemas, with both being positive in 10 subjects. There were 141 negative enemas and 133 negative colonoscopies, with 118 negative for both. Occult blood was positive in 30% of patients with polyposis, which was five to seven times more frequently than in those without evident polyposis. Colonoscopy detected polyposis in 30% of the progeny of affected people. The shortfall, compared with the 50% expected under the Mendelian hypothesis, is readily explained by removal of affected cases from the study by surgery or death from cancer.

3187 DUODENAL LESIONS IN FAMILIAL POLYPOSIS OF THE COLON. (Eng.) Yao, T.; Iida, M.; Ohsato, K.; Watanabe, H.; Omae, T. (Dept. Internal Medicine II, Kyushu Univ., Maidashi 3-1-1, Higashi-ku, Fukuoka 812, Japan). *Gastroenterology* 73(5): 1086-1092; 1977.

The diagnosis and significance of duodenal lesions in familial polyposis coli were examined by performing hypotonic duodenography, duodenofiberscopy, and endoscopic biopsy in 14 patients with familial polyposis of the colon. In 13 patients, roentgenography or endoscopy revealed adenomas of various size in the duodenum. In the remaining patient, a biopsy specimen that was taken accidentally from the papillary region showed adenoma, although neither duodenography nor endoscopy revealed any abnormality. Adenomas in most cases were multiple and relatively small in size (<5 mm in diameter), and situated in the second portion of the duodenum, whereas a solitary and large adenoma was found in rare cases. This study strongly suggests that the incidence of duodenal lesions might be higher than that previously considered. In many cases, these lesions must have been overlooked, because the conventional technique of duodenography was not sufficient to detect such small adenomas. A high incidence of adenomatous lesions of the stomach or the duodenum and complications of benign or malignant tumors of various organs in familial polyposis of the colon may suggest that this disease is a systemic or generalized disorder rather than the disease of the colon per se. Therefore, the term "familial adenomatosis coli syndrome" seems to be more appropriate than "familial polyposis of the colon."

3188 PSEUDOULCERATIONS OF THE COLON ON BARIUM ENEMA EXAMINATION. (Eng.) Frank, D. F.; Berk, R. N.; Goldstein, H. M. (Univ. Hosp., 225 W. Dickinson St., San Diego, CA 92103). *Gastrointest. Radiol.* 2(2):129-131; 1977.

Fine spiculations and punctate collections of barium projecting from the contour of the normal colon and simulating the appearance of ulcerations on barium enema examination are described. These may be due either to filling of the crypts of Lieberkuhn with barium or retention of barium in the innominate grooves of the colon. Perhaps both

combine to produce the radiographic findings. This normal variant must be carefully distinguished from actual ulcers associated with inflammatory bowel disease to avoid making a major error in diagnosis.

3189 INTESTINAL TUBERCULOSIS: EXPERIENCE AT A CANADIAN TEACHING INSTITUTION. (Eng.) Schulze, K.; Warner, H. A.; Murray, D. (Univ. Iowa Hosp. and Clinics, Iowa City, IA 52242). *Am. J. Med.* 63(5):735-745; 1977.

Thirteen cases of inflammatory bowel disease suspected to be intestinal tuberculosis were analyzed. In nine patients, the diagnosis of tuberculosis was established from such criteria as caseation necrosis, positive acid-fast stains, or cultures of the diseased tissue. In four others, enteric tuberculosis remained a diagnostic possibility as judged by the following criteria: coexistence of the bowel lesion with established tuberculosis elsewhere; a clear response to antituberculous chemotherapy; and typical features on roentgenographic, surgical, or histologic examination. The patients with intestinal tuberculosis were not necessarily recent immigrants (all were either Canadian citizens or had immigrated at least 4 yr prior to developing the disease) or poor (at least 10 were middle-class), nor did they have coexistent active pulmonary disease. Although most exhibited classic features of intestinal tuberculosis, the diagnosis was rarely considered at first. A greater awareness of the entity is needed to avoid confusion between intestinal tuberculosis and Crohn's disease.

3190 OLEOGRANULOMA OF THE RECTUM PRODUCED BY LASONIL OINTMENT. (Eng.) Greaney, M. G.; Jackson, P. R. (Royal Infirmary, Sheffield S6 3DA, England). *Br. Med. J.* 2(6093):997-998; 1977.

3191 THE RESULTS OF TREATMENT FOR COMPLETE PROLAPSE OF THE RECTUM IN THE ADULT PATIENT. (Eng.) Moore, H. D. (4 Magdalen Rd., Exeter EX2 4LY, England). *Dis. Colon Rectum* 20(7):566-569; 1977.

3192 VOLVULUS OF THE TRANSVERSE COLON: A POSTOPERATIVE COMPLICATION OF TRUNCAL VAGOTOMY AND GASTROJEJUNOSTOMY. (Eng.) Sormann, G. W.; Hardy, K. J. (Repatriation General Hosp., Heidelberg, Victoria 3077, Australia). *Aust. N.Z. J. Surg.* 46(3):249-251; 1976.

3193 TROPICAL INTUSSUSCEPTION IN ADULTS. (Eng.) Rasaretnam, R.; Kumarakulasinghe, C. B.; Eaton, H. L. (Colombo General Hosp., Colombo, Sri Lanka). *Aust. N.Z. J. Surg.* 46(1):57-63; 1976.

3194 CONTROLLED STUDY OF ORAL ADMINISTRATION OF ANTIBIOTICS IN THE PREPARATION OF DIGESTIVE SURGERY. (Fre.) Mendes da Costa, P.; Klastersky, J.; Gerard, A. (Institut Jules Bordet, Rue Heger-Bordet 1-3, B-1000 Bruxelles, Belgium). *Acta Chir. Belg.* 76(5):475-480; 1977.

3195 GRAFTS FOR ANAL SURGERY. (Fre.) Vigoni, M. (Avenue Louise 349, B-1050 Bruxelles, Belgium). *Acta Chir. Belg.* 76(5):481-487; 1977.

3196 LONGITUDINAL MYOTOMY OF THE SIGMOID. (Ita.) Polto, F.; Fusto, A.; Donati, A.; Morici, V.; Occhiato, V. (Istituto di Anatomia Chirurgica e Corso di Operazioni, Universita di Catania, Catania, Italy). *Chir. Patol. Sper.* 24(5):412-432; 1976.

3197 GARDNER'S SYNDROME: CLINICAL, RADIOLOGICAL, AND ENDOSCOPIC STUDY OF ONE CASE. (Por.) Pupo Neto, J. C.; Soares da Silva, A.; Azulay, R. D.; Abrahao, L. J. (Dep. de Medicina Clinica da Universidade Federal Fluminense, Brazil). *An. Bras. Dermatol.* 52(2):217-226; 1977.

3198 2. ANAL FISSURES. (Fre.) Poisson, J. (Centre Hospitalier Universitaire, Universite de Sherbrooke, Sherbrooke, Quebec J1H 5N4, Canada). *Can. J. Surg.* 20(5):417-421; 1977.

3199 DISORDERS OF THE CREATINE KINASE REACTION IN THE MUCOUS MEMBRANE OF THE LARGE INTESTINE IN PATIENTS WITH CHRONIC ENTEROCOLITIS. (Rus.) Shamov, I. A.; Veksler, Ya. I.; Aslanova, N. R. (Dagestan Medical Inst., Dagestan, USSR). *Vrach. Delo* (8):89-91; 1977.

3200 THE DILEMMA OF PRESERVATION OF THE RECTUM; DISCUSSION. (Eng.) Remington; Khubchandani; Schrock; Nemer. (No affiliation given). *Dis. Colon Rectum* 20(8):655-660; 1977.

3201 MULTIPLE INTESTINAL INCARCERATIONS IN INGUINAL HERNIA AS A CAUSE OF INFLAMMATORY SIGMOID TUMORS. (Pol.) Pisarski, A.; Starzewski, J.; Rudkowski, A. (I. Klinika Chirurgii Ogolnej Inst. Chirurgii Slaskiej AM, ul. Francuska 20/24, 40-027 Katowice, Poland). *Wiad. Lek.* 30(16):1293-1295; 1977.

3202 A CASE OF FAMILIAL COLONIC POLYPOSIS ASSOCIATED WITH ABNORMALITIES OF THE EXTRA GASTROINTESTINAL TRACT. (Jpn.) Okamoto, M.; Nakanishi, M.; Toda, K.; Yamanaka, T. (Okayama City Hosp., Okayama, Japan). *Jpn. J. Cancer Clin.* 23(11): 1108-1111; 1977.

3203 PATHOGENESIS OF ABDOMINAL ACTINOMYCOSIS. (Rus.) Moskovskaya, M. A. (Clinical Div., E. I. Martsinov Inst. Medical Parasitology and Tropical Medicine, Moscow, USSR). *Vestn. Khir.* 119(10):63-67; 1977.

3204 DIAGNOSTIC ERRORS IN ACUTE APPENDICITIS IN WOMEN DUE TO ANATOMO-PHYSIOLOGICAL PECULIARITIS OF THE ORGAN. (Rus.) Podonenko-Bogdanova, A. P. (Second Clinical Surgery Div., Donetsk Medical Inst., Donetsk, USSR). *Vestn. Khir.* 119(10):138-141; 1977.

3205 COLONIC AND RECTAL CHEMICAL BURNS. (Rus.) Oskretkov, V. I.; Sudorgin, V. E.; Dudchenko, V. M. (Dept. Clinical Surgery, Altai Medical Inst., USSR). *Vestn. Khir.* 119(10):125-127; 1977.

See also, 2662, 2895, 2904, 2905, 2906, 2924, 2933, 3943, 2952, 2953, 2954, 2974, 2978, 2979, 2982, 3000, 3002, 3042, 3116, 3153, 3158, 3164, 3408, 3409, 3439, 3448, 3451, 3453, 3455, 3460, 3465.

LARGE INTESTINE

Ulcerative Colitis

3206 LEUCOCYTE MIGRATION TEST WITH AUTOLOGOUS COLONIC MUCOSA AS ANTIGEN IN PATIENTS WITH ULCERATIVE COLITIS. (Eng.) Astrup, L.; Rasmussen, S. N.; Binder, V. (Frederiksberg Hosp., Ndr. Fasanvej 59, 2000 Copenhagen F, Denmark). *Scand. J. Gastroenterol.* 12(6):765-768; 1977.

Studies were carried out to evaluate the immunological parameters of ulcerative colitis by examining the patients' own colonic mucosa as a possible antigen and to determine whether a possible autohypersensitivity is specific to colonic mucosa. The leukocyte migration agarose technique (LMAT) was applied in a study of the migration of peripheral WBC in 16 patients with ulcerative colitis using three different autologous types of tissue as antigen: rectal, skin, and buccal mucosa. In all cases, the migration indices were within normal limits, and they did not differ from those in 12 controls with peptic ulcer, irritable colon, or hemorrhoidal tumors. The results do not support the theory of cellular hypersensitivity against colonic mucosa in patients with ulcerative colitis.

3207 SURGICAL MANAGEMENT OF TOXIC MEGACOLON. (Eng.) Roys, G.; Kaplan, M. S.; Juler, G. L. (Veterans Admin. Hosp., 5901 E. Seventh St., Long Beach, CA 90822). *Am. J. Gastroenterol.* 68(2):161-163; 1977.

Experience over the past 11 yr with 10 patients with chronic ulcerative colitis in whom toxic megacolon developed is presented. The patients were among a total of 220 patients admitted for chronic ulcerative colitis. Only 3 of the 10 patients had previously been treated with steroids. Steroid therapy reversed the acute process in three patients. All three patients later came to surgery. Toxic megacolon developed during the first episode of ulcerative colitis in 7 of the 10 patients. Three of the seven had colonic perforation prior to operation. Two patients died after a subtotal colectomy, and one died without operation. A delayed diagnosis was associated with sepsis in five patients and with all three deaths. Seven patients survived proctocolectomy. Prolonged medical management without a dramatic response appeared to correlate with a high postoperative morbidity. This study supports the concept of aggressive diagnosis and early surgical intervention for toxic megacolon.

3208 MUCOSAL SURFACE MORPHOLOLOGY IN ULCERATIVE COLITIS [Abstract]. (Eng.) Poulsen, S. S. (Anatomy Dept., Univ. Copenhagen, 63, Norre Alle, DK-2100 Copenhagen O, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):73; 1977.

3209 THE CARBOHYDRATE CONTENT OF ULCERATIVE COLITIS MUCUS [Abstract]. (Eng.) Teague, R. (Dept. Medicine, Univ. Bristol, Bristol BS8 1TD, England). *Adv. Exp. Med. Biol.* 89:511; 1977.

3210 RADIOLOGY IN THE CURRENT ASSESSMENT OF ULCERATIVE COLITIS. (Eng.) Bartram, C. I. (St. Mark's Hosp., City Rd., London EC1, England). *Gastrointest. Radiol.* 1(4):383-392; 1977.

3211 INCREASED SERUM BINDING TO SYNTHETIC RNA IN INFLAMMATORY BOWEL DISEASE (IBD) [Abstract]. (Eng.) DeHoratius, R. J.; Miller, W. C.; Volpicelli, N. A.; Harding, J. W.; Strickland, R. G. (Univ. New Mexico Sch. Medicine, Albuquerque, NM). *Gastroenterology* 72(5, Part 2):1047; 1977.

See also, 2903, 2950, 2982, 3000, 3460, 3464, 3466.

3212 BILE, PANCREATIC CANCER, AND THE ACTIVATION OF PANCREATIC JUICE. (Eng.) Allan, B. M.; White, T. T. (Dept. Surgery, RF 25, Univ. Washington, Seattle, WA 98195). *Biochem. Biophys. Res. Commun.* 79(2):485-492; 1977.

Mechanisms involved in the activation of pancreatic juice following mixing with bile were investigated using pancreatic juice collected postoperatively from five patients and hepatic bile from two patients. Pancreatic juice specimens mixed with one of the bile samples (1:1) became activated at varying rates when incubated at 37 C. When the pancreatic juice specimens were mixed with the other bile sample, no active trypsin was found after 96 hr of incubation of 37 C. The bile that prevented activation had a high trypsin inhibitory capacity. Lower amounts of pancreatic secretory trypsin inhibitor (PSTI) were present in the samples of pancreatic juice that activated faster with the first bile sample tested. The data also suggest that increased amounts of trypsin-PSTI complex were present in the samples of pancreatic juice that activated faster. Thus, activation in the presence of bile depends on both the individual specimens and the proportions of bile and pancreatic juice used. When calcium was added to the incubation mixture, pancreatic secretions activated in a similar order as with the trypsin inhibitor-free bile. It is proposed that bile can only activate pancreatic juice following a trigger event of sufficient magnitude, such as carcinoma, to introduce trypsin or trypsin-like enzymes (i.e., plasmin) into pancreatic secretions, resulting in the formation of large amounts of the trypsin-PSTI complex.

3213 SERUM ALPHAFETOPROTEIN IN CYSTIC FIBROSIS OF THE PANCREAS. (Eng.) Brock, D. J. H.; Barron, L.; Manson, J.; McCrae, W. M. (Western General Hosp., Edinburgh EH4 2XU, Scotland). *Clin. Chim. Acta* 82(1/2):101-103; 1978.

Serum α-fetoprotein (AFP) concentrations were measured by three different types of radioimmunoassay in 30 patients with cystic fibrosis of the pancreas and in 55 controls to investigate the usefulness of AFP in the diagnosis and heterozygote detection in cystic fibrosis. The highest value obtained in a cystic patient was 10.2 ng/ml and in a control 10.8 ng/ml. These are within published normal limits. Previously reported large increases in serum AFP in patients with cystic fibrosis and in heterozygote carriers were not confirmed.

3214 A CLINICAL EVALUATION OF ISOTOPE SCANNING, ULTRASONOGRAPHY AND COMPUTED TOMOGRAPHY IN PANCREATIC DISEASE [Abstract]. (Eng.) Braganza, J. M.; Fawcett, R. A.; Isherwood, I.; Russell, J. C. B.; Testa, H. J.; Torrance, H. B.; Howat, H. T. (Dept. Diagnostic Radiology, Univ. Manchester, Manchester, England). *Ir. J. Med. Sci.* 146(Suppl. 1):27-28; 1977.

3215 PP IN THE DIAGNOSIS OF PANCREATIC INSUFFICIENCY [Abstract]. (Eng.) Bloom, S. R.; Besterman, H. S.; Adrian, T. E.; Mallinson, C. N. (Hammersmith Hosp., London, England). *Ir. J. Med. Sci.* 146(Suppl. 1):13; 1977.

3216 SECRETORY ABNORMALITIES IN PANCREATIC CANCER [Abstract]. (Eng.) Reber, H. A.; Johnson, F. E.; Roberts, C.; Montgomery, C. (Veterans Admin. Hosp., San Francisco, CA). *Ir. J. Med. Sci.* 146(Suppl. 1):9; 1977.

3217 PATHOLOGICAL STUDIES ON THE PATHOGENESIS OF THE ALCOHOLIC LESIONS OF THE PANCREAS [Abstract]. (Eng.) Kojima, K. (Center Pathology, Kooseiren, Niigata Prefecture, Japan). *Gastroenterol. Jpn.* 12(4):340-341; 1977.

3218 A NEW METHOD TO STUDY THE CHYMOTRYPTIC ACTIVITY OF THE INTESTINAL MUCOSA BY N-BENZOYL-L-TYROSYL-PABA, AND ITS EVALUATION IN NORMALS AND IN PANCREATIC PATIENTS [Abstract]. (Eng.) Lami, F.; Bonetti, C.; Toni, A.; Miglioli, M.; Barbara, L. (Policlinico S. Orsola, Bologna, Italy). *Ir. J. Med. Sci.* 146(Suppl. 1):88; 1977.

3219 PLASMA IMMUNOREACTIVE SECRETIN RESPONSE TO ACIDIFICATION IN PANCREATECTOMIZED PATIENTS [Abstract]. (Eng.) Hanssen, L. E.; Karesen, R.; Aune, S. (Ullevaal Hosp., Oslo, Norway). *Ir. J. Med. Sci.* 146(Suppl. 1):31; 1977.

3220 THE ORAL PANCREATIC FUNCTION TEST (PFT) IN PANCREATIC AND GASTROINTESTINAL DISEASE [Abstract]. (Eng.) Mitchell, C. J.; Humphrey, C. S.; Kelleher, J.; Bullen, A. W. (St. James' Univ. Hosp., Leeds LSD 7TF, England). *Ir. J. Med. Sci.* 146(Suppl. 1):31-32; 1977.

3221 PERIAMPULLARY CANCER: CLINICAL INTRODUCTION. (Eng.) Read, A. E. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 90-94; 1977.

3222 ECTOPIC PANCREAS OF THE AMPULLA OF VATER. (Eng.) Vankemmel, M.; Houcke, M. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 153-155; 1977.

3223 CHRONIC ALCOHOLISM AND HUMAN PANCREATIC SECRETION [Abstract]. (Eng.) Palasciano, G.; Sarles, H. (INSERM, U-31, 46 chemin de la Gaye, 13009, Marseille, France). *Ir. J. Med. Sci.* 146 (Suppl. 1):34; 1977.

3224 MEASUREMENT OF PROTEIN DIGESTION BY THE GASTROINTESTINAL TRACT IN MAN USING THE ORAL LAVAGE METHOD [Abstract]. (Eng.) Love, A. H. G. (Dept. Medicine, Queen's Univ. Belfast, Belfast, Northern Ireland). *Ir. J. Med. Sci.* 146(Suppl. 1): 18-19; 1977.

3225 HEMORRHAGE IN PANCREATIC PSEUDOCYST PRESENTING AS MASSIVE GASTROINTESTINAL BLEEDING: REPORT OF A CASE. (Eng.) Stenberg, B.; Lukes, P.; Nilsson, A. E.; Darle, N. (Sahlgren's Hosp., Goteburg, Sweden). *Acta Chir. Scand.* 143(4): 249-251; 1977.

3226 PATTERN OF PANCREATIC CARCINOMA BY REAL-TIME AND GRAY-SCALE ULTRASONOGRAPHY. (Eng.) Hassani, S. N.; Smulewicz, J. J.; Bard, R. (Dept. Radiology, State Univ. New York, Stony Brook, NY). *Appl. Radiol.* 6(5):150-152, 158-159; 1977.

3227 PANCREATICODUODENAL ARTERY ANEURYSM SIMULATING CARCINOMA OF THE HEAD OF THE PANCREAS. (Eng.) Scheflan, M.; Kadir, S.; Athanasoulis, C. A.; Hedberg, S. E. (Massachusetts General Hosp., Fruit St., Boston, MA 02114). *Arch. Surg.* 112(10):1201-1203; 1977.

See also, 2769, 2948, 2982, 2986, 3008, 3009, 3010, 3155, 3228, 3231, 3236, 3353, 3401, 3411, 3426, 3445.

PANCREAS

Pancreatitis

3228 RATIONALE FOR THE USE OF CIMETIDINE IN PANCREATIC INSUFFICIENCY. (Eng.) Regan, P. T.; Malagelada, J. R.; Dimagno, E. P.; Go, V. L. W. (Mayo Clinic, Rochester, MN). *Mayo Clin. Proc.* 53(2):79-83; 1978.

The use of an H_2-receptor antagonist cimetidine in conjunction with standard p.o. pancreatic enzyme replacement therapy to induce greater transgastric passage of ingested enzymes, resulting in improved intraluminal lipolysis, was tested in patients with advanced pancreatic insufficiency. The effects of p.o.-administered cimetidine were studied in two groups of patients using a double-marker perfusion technique. Cimetidine (200-400 mg/day) had no effect on postprandial exocrine pancreatic function in 16 duodenal ulcer patients without pancreatic disease. In six patients with pancreatic insufficiency, cimetidine produced a pronounced decrease in the output of gastric acid (-63.4%, $p<0.05$ in comparison with controls) and secretory volume (-44.9%, $p<0.05$), resulting in reduction of postprandial acidity and intragastric volume. These actions of cimetidine should retard or prevent inactivation of ingested enzymes and also increase their intragastric concentration, with resulting enhancement of luminal duodenal enzyme activity. Supplemental cimetidine may thus be useful in the medical management of patients who fail to respond to routine pancreatic extract therapy alone.

3229 SERUM PHOSPHOLIPASE A IN PATIENTS WITH ACUTE PANCREATITIS. (Eng.) Hashihira, S.; Nishii, T.; Takeda, Y.; Mori, R.; Wakabayashi, A. (Osaka Medical Coll., Takatsuki, Osaka, Japan). *Jpn. Arch. Intern. Med.* 24(7):243-249; 1977.

To examine the relationship between serum phospholipase A (PLA) and serum amylase levels and the clinical symptoms of acute pancreatitis, serum PLA and amylase activities were measured in 285 patients and one hundred normal controls. The test population consisted of patients with acute pancreatitis (11), chronic pancreatitis (30), cancer of the pancreas (10), other cancers (11), hepatic diseases (30), biliary diseases (20), peptic ulcer (15), pulmonary diseases (12), renal diseases (20), diabetes mellitus (19), and mumps (7). A normal distribution of serum PLA (6.8 ± 2.1 U/ml) and of serum amylase (131 ± 31 U) was observed in the controls so that the normal ranges were thus considered to be 2.6-11.0 U/ml and 69-193 U, resp., and ≥12 U/ml and ≥200 U were considered elevations of PLA and amylase, resp. Serum PLA levels were significantly elevated ($p<0.001$) in patients with acute pancreatitis, chronic pancreatitis, pancreatic cancer, and biliary disease (50.1 ± 23.0, 29.8 ± 37.5, 13.2 ± 5.6, and 16.2 ± 8.6 U/ml, resp.). Serum amylase levels were significantly elevated ($p<0.001$) in patients with acute pancreatitis, chronic pancreatitis, pancreatic calcification, biliary disease, peptic ulcer, renal disease, and mumps (906 ± 522, 241 ± 140, 97 ± 33, 201 ± 70, 161 ± 58, 222 ± 73, and 723 ± 294 U). In patients with acute pancreatitis, amylase levels returned to normal 5-6 days after onset, while PLA levels tended to lag behind recovery 4-5 days, showing a closer correlation with the change in symptoms than did amylase levels. Serum PLA determinations may be significant in the diagnosis of acute pancreatitis and as a pathophysiological index.

3230 INHERITED DEFECT IN HEREDITARY PANCREATITIS. (Eng.) Malik, S. A.; Van Kley, H.;

Knight, W. A., Jr. (St. Mary's Health Center, 6420 Clayton Rd., St. Louis, MO 63117). *Am. J. Dig. Dis.* 22(11):999-1004; 1977.

A new kindred with three definite and six suspected cases of hereditary pancreatitis (HP) was investigated for possible inherited abnormalities. No aminoaciduria (except for a slight rise in urinary histidine in 1 patient) and no hyperparathyroidism, hyperlipidemia, or chromosomal abnormality was present. An increase in the serum IgM level of a polyclonal type was noted in three definitely affected sisters and also in two nonaffected family members. Serum alpha-1-antitrypsin and serum trypsin inhibition were normal. However, very marked dilatation and ectasia of the pancreatic duct were found in the propositus. Reviewing the data from this family and previously described kindreds, it is postulated that the genetic abnormality in HP encompasses a wide variety of structural and anatomical defects in the sphincter of Oddi or the pancreatic ductal system. These predispose to intermittent obstruction of the duct with concomitant activation of enzymes and ductal metaplasia. In suspected cases, an early effort should be made to outline the pancreatic duct, as the defect may be amenable to surgery.

3231 DETECTION OF BACTERIAL INFECTION OF THE PANCREATIC DUCTS IN PATIENTS WITH PANCREATITIS AND PANCREATIC CANCER DURING ENDOSCOPIC CANNULATION OF THE PANCREATIC DUCT. (Eng.) Gregg, J. A. (110 Francis St., Boston, MA 02215). *Gastroenterology* 73(5):1005-1007; 1977.

Studies were carried out in 35 patients with pancreatitis, 5 patients with pancreatic cancer, and 25 controls to determine whether bacterial infection of the pancreas occurs during nonsuppurative pancreatitis. During endoscopic cannulation of the main pancreatic duct, secretin was administered i.v., and pancreatic juice aspirated from within the duct was cultured. Bacterial infections were detected in 11 patients with pancreatitis and 3 with pancreatic cancer. The pancreatic juice was sterile in the controls. Cultures from the common bile duct in nine controls were also sterile, whereas four of six with pancreatitis showed infected bile. The infecting organisms were principally gram-negative, and the infections were usually polymicrobial. Antibiotics, where used, successfully eradicated the infecting organisms but did not appear to affect the patient's clinical course.

3232 SERUM AMYLASE ISOZYMES IN PATIENTS WITH CHRONIC PANCREATITIS WITH HYPERAMYLASEMIA. (Eng.) Wakabayashi, A.; Saeki, M.; Mori, R.; Oshiba, S. (Second Dept. Medicine, Osaka Medical Coll., 2-7, Daigaku-cho, Takatsuki, 569 Japan). *Gastroenterol. Jpn.* 12(4):269-274; 1977.

Serum amylase isozymes were determined in 39 patients with chronic pancreatitis, including 13 with alcoholic pancreatitis, and in 23 healthy control subjects to clarify the relationship between hyperamylasemia and clinical states in chronic pancreatitis. The serum pancreatic type isoamylase (P-amylase) levels were 359 ± 109 IU/l in 7 patients with chronic pancreatitis in a state of acute exacerbation and 80 ± 43 IU/l in 32 patients with chronic pancreatitis in remission compared with a control value of 127 ± 19 IU/l. In all 39 patients, the serum P-amylase activity showed a positive correlation with the amylase secreting capacity of the pancreas. The serum-salivary type isoamylase (S-amylase) activity was higher in the acute exacerbation group (223 ± 120 IU/l) than in controls (123 ± 26 IU/l), but it was the same as the control value in the remission group (142 ± 66 IU/l) except for some cases that showed higher values. There were 10 patients who displayed hyperamylasemia, which was apparently due to the acute exacerbation in 7 cases. The serum P-amylase activity was high in all patients with acute exacerbation (range, 196-553 IU/l), and the serum S-amylase was also high in three of these patients (228, 256, and 475 IU/l, resp.). In three patients who had alcoholic pancreatitis and displayed hyperamylasemia without acute exacerbation, the P-amylase was low (14, 26, and 27 IU/l, resp.), and the S-amylase activity was markedly elevated (314, 324, and 351 IU/l, resp.). The ratio of amylase clearance to creatinine clearance was measured in 15 of the patients, and the values were within normal limits in all of the patients (1.48-4.20%). It is emphasized that hyperamylasemia in chronic pancreatitis may be caused by high S-amylase activity in addition to high P-amylase activity, especially in alcoholic pancreatitis.

3233 PRIMARY CHRONIC PANCREATITIS. A CLASSIFICATION BASED ON ENDOSCOPIC PANCREATOGRAPHY. (Fre.) Cremer, M.; Toussaint, J.; Hermanus, A.; Deltenre, M.; De Toeuf, J.; Engelholm, L.; *et al.* (Rue de la Reforme 60, B-1060 Brussels, Belgium). *Acta Gastroentrol. Belg.* 39(11/12):522-546; 1976.

3234 POSSIBILITIES AND LIMITATIONS OF THE CLASSIC RADIOLOGICAL EXAMINATION IN THE DIAGNOSIS OF PRIMARY CHRONIC PANCREATITIS. (Fre.) Engelholm, L.; De Toeuf, J.; Hermanus, A.; Struyven, J.; Cremer, M.; Deltenre, M.; *et al.* (Institut J. Bordet, Rue Heger Bordet 3, B-1000 Brussels, Belgium). *Acta Gastroenterol. Belg.* 39(11/12): 405-425; 1976.

3235 RADIOLOGICAL POSSIBILITIES IN THE DIAGNOSIS OF CHRONIC PANCREATITIS. (Ita.) Pistolesi, G. F. (Policlinico Borgo Roma, Verona, Italy). *Minerva Med.* 68(30):2085-2086; 1977.

3236 DIAGNOSIS OF CHRONIC PANCREATITIS WITH PANCREATIC DUCT OBSTRUCTION. (Rus.) Shalimov, S. A.; Shkarban, P. E.; Bogomolova, T. N.; Shpontak, A. S. (Kiev Scientific Res. Inst. Clinical and Experimental Surgery, Kiev, USSR). *Klin. Khir.* (4):21-25; 1977.

3237 SIGNIFICANCE OF CLINICAL METHODS IN THE DIAGNOSIS OF PANCREATITIS IN CHILDREN. (Rus.) Gudzenko, Z. P. (Second Dept. Pediatrics, Kiev Inst. Advanced Medical Studies, Kiev, USSR). *Vopr. Okkr. Materin. Det.* 22(2):38-42; 1977.

3238 SIGNIFICANCE OF AMYLASE CLEARANCE RELATIVE TO CREATININE CLEARANCE. ITS DIAGNOSTIC VALUE IN ACUTE PANCREATITIS: REPORT OF 191 CASES. (Fre.) Hostein, J.; Fournet, J.; Bonnet-Eymard, J. (CHU de Grenoble, 38700 La Tronche, France). *Gastroenterol. Clin. Biol.* 1(4):405; 1977.

3239 DIAGNOSIS AND TREATMENT OF ACUTE PANCREATITIS. (Rus.) Matyashin, I. M.; Voitenko, A. A.; Zaverny, L. G.; Malinovsky, Yu. F. (Surgical Clinic, Kiev Medical Inst., Kiev, USSR). *Khirurgiia (Mosk.)* (3):67-71; 1977.

3240 COMPLEX THERAPY OF ACUTE PANCREATITIS. (Rus.) Babris, I. V. (Clinic General Surgery, Riga Medical Inst., Riga, USSR). *Khirurgiia (Mosk.)* (3):77-79; 1977.

3241 CHANGES IN THE TREATMENT OF ACUTE PANCREATIC NECROSIS. (Ger.) Hollender, L. F. (III. Chirurgische Universitats-Klinik, Strasburg, France). *Fortschr. Med.* 95(15):1029-1031; 1977.

3242 TREATMENT OF ACUTE PANCREATITIS. (Ger.) Muller-Wieland, K. (I. Medizinische Universitatsklinik, Martinistr. 52, 2000 Hamburg 20, W. Germany). *Dtsch. Med. Wochenschr.* 101(47): 1729-1731; 1976.

3243 LABORATORY INFORMATION AND SOME PROBLEMS OF INTENSIVE THERAPY OF PATIENTS WITH ACUTE PANCREATITIS. (Rus.) Lashchevker, V. M. (Second Dept. Surgery, Odessa Medical Inst., Odessa, USSR). *Klin. Khir.* (4):13-17; 1977.

3244 INTRAGASTRIC HYPOTHERMIA FOR ACUTE PANCREATITIS IN CHILDREN. (Rus.) Ankudinov, F. S.; Savostin, A. I. (Yuzhno-Sakhalinsk Municipal Hosp., Yuzhno-Sakhalinsk, USSR). *Khirurgiia (Mosk.)* (3):83-85; 1977.

3245 ROLE OF HYPOTHERMIA IN COMPLEX THERAPY OF ACUTE PANCREATITIS. (Rus.) Kotelnikov, V. P.; Pankov, V. I.; Biryukov, V. I. (Surgical Clinic, Ryazan Medical Inst., Ryazan, USSR). *Khirurgiia (Mosk.)* (3):74-77; 1977.

3246 PRELIMINARY EXPERIENCE WITH GLUCAGON TREATMENT IN ACUTE NECROTIC PANCREATITIS. (Ger.) Wagner, I.; Wilke, E.; Dietze, F. (Medizinische Klinik des Stadtischen Krankenhauses Berlin-Kopenick, Salvador-Allende-Str. 2-8, 117 Berlin, E. Germany). *Dtsch. Gesundheitsw.* 31 (39):1861-1863; 1976.

3247 PROBLEMS OF DIETARY PROPHYLAXIS AND THERAPY OF CHRONIC PANCREATITIS. (Ita.) Finzi, M. (Universita di Bologna, Galleria del Leone 2, Bologna, Italy). *Minerva Med.* 68(30): 2093-2102; 1977.

3248 CLINICAL STUDY OF CONSERVATIVE COMBINATION THERAPY FOR ACUTE PANCREATITIS. (Ger.) Moser, H. (III. Chirurgischen Abteilung des Allgemeinen Krankenhauses Graz, Grillparzerstrasse 2, A-8010 Graz, Austria). *Wien. Med. Wochenschr.* 127(14):457-458; 1977.

3249 PROPOSAL FOR THE NOSOLOGICAL CLASSIFICATION OF ACUTE PANCREATITIS FOR THE CORRECT COMPARATIVE ASSESSMENT OF THE THERAPEUTIC EFFICACY OF DRUGS. (Ita.) Di Macco, G.; Pappalardo, G. (II. Clinica Chirurgica, Universita degli Studi di Roma, Roma, Italy). *Ann. Ital. Chir.* 48(2):209-214; 1976.

3250 PRINCIPAL CRITERIA OF DRUG TREATMENT OF CHRONIC PANCREATITIS. (Ita.) Fontana, G.; Gullo, L.; Ventrucci, M.; Costa, P. L.; Caletti, G. C.; Bolondi, L.; Ripani, R. (Istituto di Clinica Medica I, Universita degli Studi di Bologna, Bologna, Italy). *Minerva Med.* 68(30):2103-2108; 1977.

3251 EFFECT OF A BENZOPYRENE PREPARATION IN ACUTE HEMORRHAGIC NECROTIZING PANCREATITIS DURING SURGICAL THERAPY. (Ger.) Vida, S. (Evangelisches Krankenhaus, 5070 Bergisch-Gladbach, W. Germany). *Therapiewoche* 27(30):5476-5483; 1977.

See also, 2751, 2752, 2775, 2950, 2978, 3010, 3214, 3217, 3220, 3225, 3353, 3402, 3411, 3425, 3436.

3252 IMMUNOLOGICAL CHANGES IN LIVER DISEASE. (Eng.) Sherlock, S. (Royal Free Hosp., Pond St., London NW3 2QG, England). *Proc. R. Soc. Med.* 70(12):851-855; 1977.

Immunological changes in liver disease are reviewed. They may be induced either by liver damage, irrespective of the cause, or by specific factors present in any particular liver disease. The hypergammaglobulinemia observed in most cases of liver disease is probably caused by the failure of the damaged liver to clear antigens. The depressed cell-mediated (T-cell) immunity in chronic liver disease probably releases inhibition of B lymphocytes as a consequence of lack of suppressive T cells. In chronic active hepatitis, immunological changes are associated with a persistance of hepatitis B surface antigen (HBsAg) in the serum or with a negative HBsAg test. The following mechanisms of liver injury are presented: (1) direct action of complement fixing antibodies on the liver cell membrane, (2) formation of local immune complexes fixing complement, (3) T-cell mediated cytotoxity, and (4) antibody-dependent cellular cytotoxity. The latter mechanism seems to be the most important. Mechanisms of bile duct destruction in primary biliary cirrhosis are unclear. Smooth muscle antibody (SMA) is detected in high titers in two-thirds of patients with HBsAg-negative chronic active hepatitis (CAH). It is much less frequent and present in low titers in those with HBsAg-positive CAH. SMA can be found in low titers in 80% of patients with type A or B hepatitis. Mitochondrial antibodies occur in serum of 90% of patients with primary biliary cirrhosis, being a very important diagnostic test. Relatives of patients with either HBsAg-negative CAH or primary biliary cirrhosis show an increased incidence of antinuclear antibodies and SMA. In cryptogenic cirrhosis and CAH, an increased incidence of histocompatibility antigens HLA 1 and HLA 8 is observed. Autoantibodies against liver cell membranes were demonstrated in HBsAg-negative CAH and in cryptogenic cirrhosis.

3253 ALTERATIONS OF THE RESPIRATORY FUNCTION DURING HEPATOPATHIES WITH IMMUNE INVOLVEMENT. (Fre.) Nouvet, G.; Le Loet, C.; Pasquis, P.; Colin, R.; Bourreille, J.; Hemet, J.; *et al.* (Hopital Charles-Nicolle, 1, rue de Germont, 76038 Rouen Cedex, France). *Poumon Coeur* 33(3):175-182; 1977.

Respiratory function tests were performed in 24 patients with histologically confirmed chronic hepatitis. According to De Groote's classification, 13 patients had chronic aggressive hepatitis, 9 had chronic persisting hepatitis, and 2 had active posthepatitic cirrhosis. The respiratory function was found to be normal in 2 patients only; 14 patients were found to have reduced alveolocapillary transfer capability, and 8 others had hyperinflation syndrome. The reduction of the alveolocapillary transfer may be due to diffuse interstitial pulmonary lesions that are observed in some cases of chronic hepatitis. This interstitial lesion obviously involves immune phenomena with participation of Australia antigen or other antigens. The hyperinflation syndrome, observed in four patients without past bronchopulmonary disease, is probably due to emphysema, whose association with chronic hepatitis has not been reported before.

3254 CANCER OF THE LIVER: PATHOGENESIS AND RECENT AETIOLOGICAL FACTORS. (Eng.) Anthony, P. P. (Middlesex Hosp. Medical Sch., London W1, England). *Trans. R. Soc. Trop. Med. Hyg.* 71(6):466-470; 1977.

The pathogenesis of experimental liver tumors and precursor lesions of liver cancer and the etiology of liver cancer in man are reviewed. The majority of chemical carcinogens require metabolic conversion to a reactive derivative by liver microsomal enzymes. Numerous different effects are produced in every part of the cell, but the most important is probably the damage to nuclear DNA. In experimental liver carcinogenesis, results depend on dose and rate of administration of a carcinogen, the species of the animals, age, sex, state of nutrition, and manipulation of the hormonal background or the rate of liver cell turnover. The process of carcinogenesis includes several phases of neoplastic initiation and development, which include initiation that produces altered hepatocytes, phenotypic changes, nodule formation, and the final cancer phase. Three populations of morphologically recognizable altered hepatocytes act at different stages of liver carcinogenesis. In man, a macronodular cirrhosis and hepatitis B are usually found in association with liver carcinoma. A familial occurrence of liver carcinoma was reported both with and without cirrhosis. There is no evidence that alcohol itself, without cirrhosis and malnutrition, increases the risk of liver tumor. It is also unclear whether iron overload and parasite infestations of the liver are associated with carcinoma. Several naturally occurring substances such as pyrrolizidine alkaloids, cycasin, safrole, some native remedia, and nitrosamines are among carcinogens. Liver tumors can be caused by such drugs and chemicals as the contrast medium Thorotrast, potassium arsenite in Fowler's solution, arsenical insecticides, vinyl chloride monomer, and anabolic/androgenic steroids.

3255 DEARTERIALIZATION OF THE LIVER FOR METASTATIC CANCER: CLINICAL, ANGIOGRAPHIC AND PATHOLOGIC OBSERVATIONS. (Eng.) McDermott, W. V., Jr.; Paris, A. L.; Clouse, M. E.; Meissner, W. A. (185 Pilgrim Rd., Boston, MA 02215). *Ann. Surg.* 187(1):38-46; 1978.

Experience with five cases of dearterialization of the liver for metastatic cancer is presented. Subjective and objective improvement in carcinoid syndrome for 2 yr was obtained in one patient who is living with extensive visceral and skeletal metastases 40 months after dearterialization. Excellent palliation was achieved in two other patients, one

with carcinoma of the endometrium and the other with adenocarcinoma of the left colon; both died at 1 yr and 11 months, resp., after surgery. No improvement or palliation was observed in the two remaining patients. In one, the extent of dearterialization was inadequate, while in the other extensive necrosis of hepatic metastases was observed at postmortem examination. There was no evidence of serious damage to the hepatic parenchyma, either by liver function tests or by microscopy, as a result of interruption of arterial inflow. Microscopic observations of the tumors revealed extensive necrosis in all large tumor masses, but smaller nodules (less than 50 μm in diameter) maintained apparent viability. Postoperative angiographic studies revealed the difficulty in achieving complete dearterialization and the rapidity with which large collateral channels develop. Based on these arteriographic observations, the following operative procedure is recommended: dissection; identification and ligation of the common and proper hepatic arteries, the gastroduodenal artery, the right and left hepatic arteries, and the left gastric artery; and division of the triangular, falciform, and hepatorenal ligaments. This degree of devascularization should provide maximum effect on the tumor, and it was shown in two of the above cases that hepatic parenchyma survives even extensive dearterialization.

3256 BENIGN NON-PARASITIC CYSTS OF THE LIVER: A REVIEW OF 18 CASES. (Eng.) Wong, J.; Little, J. M. (Dept. Surgery, Univ. Sydney, Sydney, Australia). *Aust. N.Z. J. Surg.* 47(2):209-215; 1977.

Eighteen cases of benign nonparasitic cysts of the liver, seen during 1965-1974, are reviewed, with case histories given for four patients. Ten patients had the localized form and eight the generalized form of cystic disease. The ratio of women to men was 2:1 in both groups and the average age was 50. A correct preoperative diagnosis was made in five patients; in two patients with solitary cysts, the diagnosis was made at liver biopsy and in three polycystic patients, the diagnosis was made from their clinical features and investigatory findings. Associated conditions for which operation was necessary included carcinoma of colon or rectum (3), chronic duodenal ulcer (2), ruptured spleen, esophageal stricture, and lipoma of the ileocecal valve (1 each). Two patients died from complications of the cyst or of operations directed at the cyst: one from intrathoracic rupture of an abscess in the polycystic liver, and the other after cystojejunostomy, from cardiac and renal failure. Two of the patients suffered complications that have not been previously reported, i.e., abscess formation in a polycystic case and retrohepatic caval obstruction by a solitary cyst. Although many characteristics of the cysts in both solitary and polycystic groups are similar, the major differences are a positive family history, the association of cystic disease elsewhere, and the associated congenital anomalies in the polycystic group.

3257 HEPATIC GRANULOMATA: PROBLEMS IN INTERPREPARATION. (Eng.) Klatskin, G. (No affiliation given). *Mt. Sinai J. Med.* 46(6):798-812; 1977.

Problems in interpretation of hepatic granulomata are discussed and illustrated by a short review of data from 742 cases of biopsy-documented hepatic granulomata. The 565 cases of epithelioid granulomata were classified into three groups: (1) granulomatous disease (319 patients), (2) underlying hepatic disease (174), and (3) miscellaneous disorders of other etiology (72). In 177 cases, the lesions were diagnosed as lipogranulomata. A high incidence of hepatic granulomata (94%) was observed in sarcoidosis. However, such lesions gave rise to few clinical manifestations or hepatic impairment. The hepatic lesions in most forms of granulomatous disease were so similar that the diagnosis depended on the clinical features, serologic and skin tests, and bacterial and viral cultures rather than on histologic examination. Nonspecific granulomata can be found in primary biliary cirrhosis, Laennec's cirrhosis, acute viral hepatitis, and cytomegalovirus hepatitis. The third category of patients with granulomata were those whose underlying disease was primarily neither granulomatous nor hepatic in nature. These had lymphoma, carcinoma, ulcerative colitis, or Crohn's disease (19); acute viral or bacterial infections (8); psoriasis with gout and/or hyperuricemia (8); or disorders that defied diagnosis (37). In the latter cases, the hepatic granulomata may represent a nonspecific response to underlying disease or may be attributable to the action of some specific agent. The hepatic granulomata found in association with liver disease usually represent a nonspecific response to underlying disease.

3258 REGULATION OF BILE ACID SYNTHESIS IN HYPERLIPOPROTEINEMIA. (Eng.) Hellstrom, K.; Angelin, B.; Einarsson, K.; Kallner, M.; Leijd, B. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 235-239; 1977.

Bile acid kinetics were studied with the isotope-dilution technique and the serum triglyceride turnover with the [^{3}H]glycerol technique in patients with hyperlipoproteinemia (HLP). The formation of bile acid in HLP type IV, characterized by elevated levels of very low-density lipoproteins (VLDL), exceeded that seen in HLP types IIa (elevated levels of low-density lipoproteins [LDL]) and IIb (elevated levels of LDL and VLDL). The formation of triglyceride correlated significantly with that of bile acid (particularly with cholic acid) in HLP type IIa ($p<0.001$) and type IV ($p<0.01$) and in the combined series of patients ($p<0.001$). Further evidence of an integration between triglyceride and bile acid formation was obtained in HLP type II by studying regimens that may primarily increase (cholestyramine administration) or inhibit (chenodeoxycholic acid feeding) bile acid formation and in HLP

type IV by studying regimens that inhibit (clofibrate or nicotinic acid treatment or weight reduction) or stimulate (carbohydrate-rich diets) the hepatic triglyceride formation.

3259 MALIGNANT PAPILLOMATOSIS OF THE INTRAHEPATIC BILE DUCTS. (Eng.) Helpap, B. (Inst. Pathology, Univ. Bonn, Postfach 2120, D-5300 Bonn-Venusberg, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):419-425; 1977.

A case of a woman born in 1934, with recurring intrahepatic bile duct papillomatosis involving the left hypoplastic hepatic lobe, is reported. A biopsy of the left lobe showed chronic cholangitis, pericholangitis, and biliary cirrhosis. Treatment included a left hemihepatectomy with excision of biliogastric and external fistulas. A gastroduodenal fistula developed that excreted 3 l of fluid daily, and the papillomatosis progressed to a mucin-secreting papillary adenocarcinoma. The patient died despite infusions of electrolyte solutions (6 l/day). A review of 12 previously described cases of extra- and intrahepatic bile duct papillomatosis is given, and it is suggested that these lesions be considered as low-grade carcinomas as soon as they are diagnosed.

3260 USE OF HEMATIN IN THE ACUTE ATTACK OF THE "INDUCIBLE" HEPATIC PORPHYRIAS. (Eng.) Watson, C. J.; Pierach, C. A.; Bossenmaier, I.; Cardinal, R. (Northwestern Hosp., Minneapolis, MN). *Adv. Intern. Med.* 23:265-286; 1978.

The role of hematin (HT) in early termination of acute attacks of the "inducible" hepatic porphyrias was studied in 24 patients who had acute intermittent porphyria, porphyria variegata, or hereditary hepatic coproporphyria. An improved HT perfusion method was applied. The dose of HT per each infusion performed at 12 to 24 hr intervals was 4 mg/kg body weight and also depended on the clinical condition of the patient. The effect of HT depended on the amount infused per unit time. According to severity of neurologic symptoms, the following classes of the disease were encountered: (A) autonomic signs and symptoms, Gunther's triad, leg pain, paresthesis, restricted paresis, psychiatric manifestations, and mild hypertension; (B) autonomic signs, severe peripheral neuropathy, quadriparesis, hypertension, tachycardia, urinary retension, dysuria, obstipation, psychotic seizures, and inappropriate antidiuretic hormone syndrome (IADHS); and (C) life-threatening central, peripheral and autonomic disturbances, extensive paralysis, quadriparesis, psychotic symptoms, seizures, IADHS, and disturbed consciousness or coma. Selected case reports are presented. In cases of class A severity, one to three infusions were sufficient to cause a prompt recovery, while in cases of class B or C, a very slow but considerable improvement was observed after four to eight HT infusions. Infusion of HT is a valuable treatment in acute attacks of the hepatic porphyrias.

3261 LIVER ULTRASTRUCTURE IN PSORIATICS RELATED TO METHOTREXATE THERAPY. 1. A PROSPECTIVE STUDY OF FINDINGS IN HEPATOCYTES FROM 24 PATIENTS BEFORE AND AFTER METHOTREXATE THERAPY. (Eng.) Nyfors, A.; Hopwood, D. (Dept. Dermatology, Finson Inst., Copenhagen, DK-2100, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 85(6):787-800; 1977.

Liver biopsies from 24 psoriatics with severe psoriasis before and after methotrexate (MTX) therapy were studied by light and electron microscopy. MTX apparently caused hepatocyte damage, which was reflected by the increased number of membrane whorls ($p<0.05$) and the increased accumulation of lipid droplets ($p<0.05$) observed in the patients' hepatocytes in comparison with that in controls. There was an increase ($p<0.05$) in autophagic vacuoles, which mostly contained glycogen and cell sap with residual bodies. These residual bodies were found in an increased number in the nearby Kupffer cells. Crystals occurred in megamitochondria in most patients before and after MTX therapy. Some of these crystals were found free in the cytoplasm. Mitochondria containing crystals were shown in autophagic vacuoles, representing possible pathways of their breakdown. Bile canaliculi commonly contained debris, but only one patient had evidence of cholestasis. There was no significant change in nuclei, Golgi apparatus, or the endoplasmic reticulum and no statistically significant correlation between the changes in the treated patients and the total dose of MTX given.

3262 LIVER ULTRASTRUCTURE IN PSORIATICS RELATED TO METHOTREXATE THERAPY. 2. FINDINGS IN BILE DUCTS FROM 11 METHOTREXATE TREATED PSORIATICS AND 2 CONTROLS. (Eng.) Hopwood, D.; Nyfors, A. (Dept. Dermatology, Finson Inst., Copenhagen, DK-2100 Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 85(6):801-811; 1977.

Liver biopsy specimens from 11 psoriatics receiving methotrexate (MTX) were studied with the light and electron microscope and compared with normal material. Thick sections (1 μm) showed light and dark cells in biliary epithelium and lipofuscin granules. At the ultrastructural level, the presence of these structures was confirmed. The lumen of the bile ducts contained debris. The microvilli were decreased in number, and damaged forms were seen. Damage to the biliary epithelial mitochondria was widespread, and there were foci of intracellular edema. The Golgi apparatus was hypertrophied and dilated. Atrophic cells were seen. The lateral intercellular spaces were dilated and contained debris, and the basement membrane showed zones of duplication. Similar changes were found in the ducts of Hering.

3263 THE COAGULATION DISORDER OF ORTHOTOPIC HEPATIC TRANSPLANTATION. (Eng.) Bohming,

H. J. (Krankenhaus Amstetten, A-3300, Austria). *Semin. Thromb. Hemostas.* 4(1):57-82; 1977.

Coagulation data in clinical and experimental liver transplantation accumulated over the last 14 yr are reviewed, and coagulation findings in a new series of 10 human liver recipients are presented. Systemic fibrinolysis is transiently induced during orthotopic hepatic transplantation, but its significance for the generation of coagulation changes and consecutive hemorrhages has been questioned. Intravascular coagulation has been encountered both during recipient hepatectomy (particularly the anhepatic phase) and after revascularization of the graft. In human liver transplantation, exogenous heparin as well as fibrin degradation products probably account for the prolongation of thrombin time, which often is encountered after revascularization of the hepatic graft. Bleeding was significant in all 10 patients during recipient hepatectomy and again, in some of them, after revascularization of the graft. The instant incoagulability of the recipient's blood, which was noted as soon as the liver had been revascularized in four new cases, was due to heparin contained in the solution used for the graft perfusion; this kind of anticoagulant activity was not observed in those recipients who had been given livers perfused with heparin-free solutions. The severity as well as duration of the coagulation changes following orthotopic hepatic transplantation depend primarily on the quality of the donor organ, with an adequately preserved liver almost instantaneously resuming its functions.

3264 CYTOTOXICITY OF LYMPHOCYTES AGAINST HUMAN LIVER PROTEIN IN PATIENTS WITH HEPATOPATHY. (Dut.) Vogten, A. J. M. (No affiliation given). *Ned. Tijdschr. Geneeskd.* 121(28):1155; 1977.

3265 HEPATIC TISSUE VENTILATION IN BILE OUTFLOW SYSTEM PATHOLOGY AND THE EFFECT OF HYPERBARIC OXYGENATION ON THE COURSE OF HEPATIC INSUFFICIENCY. (Rus.) Belokurov, Ju. N.; Murav'eva, L. A.; Rybachkov, V. V. (Clinic Hosp. Surgery, Yaroslavl Medical Inst., Yaroslavl, USSR). *Vestn. Khir.* 117(9):34-37; 1976.

3266 LIVER PATHOLOGY FOLLOWING MYOCARDIAL INFARCTION. (Rus.) Guzeeva, V. A. (First Dept. Therapy, Alma-Ata Inst. Advanced Medical Studies, Alma-Ata, USSR). *Kardiologiia* 17(1): 119-123; 1977.

3267 INTRAVITAL STUDY OF ENERGY EXCHANGE IN THE LIVER OF MITRAL STENOSIS PATIENTS. (Rus.) Meshalkin, E. N.; Kremleva, L. A.; Arkhipova, G. F.; Shurgaya, A. M.; Chasovskikh, G. G.; Korepanova, G. A.; *et al.* (Inst. Circulatory Pathology, RSFSR Ministry of Public Health, Novosibirsk, USSR). *Kardiologiia* 17(1):54-57; 1977.

3268 HEPATIC BLOOD CIRCULATION DURING OPERATIONS ON THE EXTRAHEPATIC BILE DUCTS PERFORMED UNDER NEUROLEPTOANALGESIA AND ETHER ANESTHESIA. (Rus.) Dubitsky, A. E. (Kiev Scientific Res. Inst. Clinical and Experimental Surgery, Kiev, USSR). *Klin. Khir.* (2):44-50; 1977.

3269 HEMIHEPATECTOMY WITH "BYPASS" OF THE INFERIOR VENA CAVA: REPORT OF NINE CASES OF MALIGNANT HEPATIC TUMORS IN CHILDREN. (Fre.) Monereo, J. (Pediatric Clinic "La Paz," Madrid, Spain). *Ann. Chir. Infant.* 18(1):77-83; 1977.

3270 RADIATION THERAPY OF LIVER CANCER METASTASES. (Jpn.) Okawa, T.; Nakama, M.; Ogawa, S.; Kaneta, K.; Tsuya, A.; Kawai, T. (Cancer Res. Center Hosp., Tokyo, Japan). *Jpn. J. Cancer Clin.* 23(8):822-830; 1977.

3271 LIVER TUMORS FOLLOWING THERAPY WITH CONTRACEPTIVES AND ANABOLIC DRUGS. (Ger.) Scheuer, A.; Lehmann, F. G. (Medizinische Universitatsklinik, E. Mannkopffstrasse 1, D-3550 Marburg/Lahn, W. Germany). *Internist (Berlin)* 18(4):208-214; 1977.

3272 HEMANGIOENDOTHELIOMA OF THE LIVER IN CHILDREN. (Fre.) Hata, Y.; Uchino, J.; Kasai, Y. (First Dept. Surgery, Hokkaido Univ., Sapporo, Japan). *Ann. Chir. Infant.* 18(1):62-65; 1977.

3273 TRAUMATIC SUBCAPSULAR LIVER HEMATOMA. (Ger.) Mebold, A.; Gonzenbach, R. (Kantonsspital, CH-8500 Frauenfeld, Switzerland). *Helv. Chir. Acta* 44(1/2):103-105; 1977.

3274 DIRECT IMAGE OF HEPATIC LIPOMA. (Fre.) Hoeffel, J. C.; Etzel, J. C.; Drouin, P.; Boissel, P. (Hopital Jeanne d'Arc, 54 201, Dommartin-les-Toul, France). *J. Can. Assoc. Radiol.* 28(2): 153-155; 1977.

3275 HEPATIC TERATOMA. REPORT OF ONE CASE IN A CHILD. (Fre.) Fabre, C.; Gregoire, A.; Scheiner, C.; Basbous, D.; Lebreuil, G. (Laboratoire d'Anatomie pathologique, Faculte de Medecine, bd P.-Dramard, 13326 Marseille Cedex 3, France). *Arch. Anat. Cytol. Pathol.* 25(3):209-212; 1977.

3276 MULTIPLE CHOLANGIOGENIC LIVER ABSCESSES. (Rus.) Pomelova, L. A.; Zavenian, Z. S.; Gul'diaev, V. G. (Dept. Hepatic and Biliary Surgery, All-Union Scientific Res. Inst. Clinical and Experimental Surgery, Moscow, USSR). *Khirurgiia (Mosk.)* (3):52-53; 1977.

3277 AGENESIS OF THE RIGHT HEPATIC LOBE. (Fre.) Routier, G.; Petyt, B.; Florin, M.;

Bernard, J. M.; Deffontaine, O. (Clinique St-Jean, 34, rue St-Jean, F 59100 Roubaix, France). *Ann. Med. Interne (Paris)* 128(3):275-280; 1977.

3278 LIVER AND HEREDITARY ALPHA-1-ANTITRYPSIN DEFICIENCY IN ADULTS. (Fre.) Feldmann, G. (Hopital Beaujon, 100, boulevard du General-Leclerc, 92110 Clichy, France). *Rev. Fr. Trans. Immunohepatol.* 20(1):95-104; 1977.

3279 ALPHA-1-ANTITRYPSIN DEFICIENCY AND LIVER PATHOLOGY IN CHILDREN. (Fre.) Hadchouel, M.; Odievre, M. (Hopital de Bicetre, 94270 Le Kremlin-Bicetre, France). *Rev. Fr. Trans. Immunohepatol.* 20(1):105-106; 1977.

3280 CLINICO-LABORATORY ASPECTS OF LIVER ALVEOCOCCOSIS. (Rus.) Vasiliev, R. Kh.; Nabokov, Sh. A. (Kamchatka Oblast Dept. Public Health, Petropavlovsk-Kamchatskii, USSR). *Klin. Med. (Mosk.)* 55(4):78-80; 1977.

3281 LONG-TERM RESULTS OF LIVER RESECTION FOR ALVEOCOCCOSIS. (Rus.) Zhuravlyov, V. A.; Vasilyev, P. N. (Surgical Clinic, Kirov Scientific Res. Inst. Blood Transfusion, Kirov, USSR). *Klin. Khir.* (2):41-44; 1977.

3282 Echinococcus alveolaris AND cysticus OF THE LIVER. (Ger.) Gamstatter, G.; Kurock, W.; Herrmann, G. (Chirurgische Universitatsklinik, Langenbeckstrasse 1, 6500 Mainz, W. Germany). *Z. Gastroenterol.* 15(2):126-137; 1977.

3283 THE IMMEDIATE AND LATE RESULTS OF TREATMENT FOR HEPATIC ECHINOCOCCOSIS. (Rus.) Askerkhanov, R. P.; Saidov, G. S.; Makhatilov, M. M. (Surgical Clinic, Dagestan Medical Inst., Dagestan, USSR). *Vestn. Khir.* 116(6):41-46; 1976.

3284 SCINTIGRAPHIC AND ULTRASONIC DIAGNOSIS OF HYDATID DISEASE OF THE LIVER. (Hun.) Csuz, L.; Kun, L. (Magyar Allamvasutak Korhaza, "A" Belgyogyaszati Osztaly, Pecel, Hungary). *Orv. Hetil.* 118(17):994-996; 1977.

3285 CURRENT THERAPEUTIC POSSIBILITIES IN HEPATIC ENCEPHALOPATHY. (Ita.) Imler, M. (Centre Hospitalier Universitaire, 67005 Strasbourg, Cedex, France). *Minerva Med.* 68(15):961-976; 1977.

3286 INDICATION AND PROGNOSIS OF HETEROLOGOUS LIVER PERFUSION IN THE TREATMENT OF SEVERE HEPATIC COMA. (Ger.) Schwarzer, R.; Otto, U.; Keitel, R.; Kohler, K.; Graf, B. (Chirurgische Klinik, Karl-Marx-Universitat, Liebigstr. 20a, DDR-701 Leipzig, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):187-188; 1976.

3287 THERAPY OF ACUTE HEPATIC FAILURE. (Ger.) Reiter, H. J. (Medizinische Universitatsklinik, Mannkopffstrasse 1, D-3550 Marburg, W. Germany). *Internist (Berlin)* 18(4):215-220; 1977.

3288 HEMOBILIA SYNDROME. A RARE COMPLICATION OF DIRECTED LIVER BIOPSY. (Ger.) Pohle, W.; May, B.; Bohle, H.; Fritze, E. (Berufsgenossenschaftl. Krankenanstalten Bergmannsheil, 4630 Bochum, W. Germany). *Med. Welt* 28(3):125-126; 1977.

3289 CLINICO-BIOCHEMICAL CHARACTERISTICS OF LIVER CIRRHOSIS IN HEPATO-CEREBRAL DYSTROPHY (WILSON-KONOVALOV'S DISEASE). (Rus.) Makarova, V. A. (Dept. Neuropathy, Leningrad Inst. Medicine and Hygiene, Leningrad, USSR). *Klin. Med. (Mosk.)* 55(4):68-74; 1977.

3290 LIPID METABOLISM IN PATIENTS WITH MECHANICAL JAUNDICE OF DIFFERENT ETIOLOGY. (Rus.) Shalimov, A. A.; Soroka, A. M.; Shuliak, O. S.; Ishchuk, O. E. (Kiev Scientific Res. Inst. Clinical and Experimental Surgery, Kiev, USSR). *Vrach. Delo* (9):109-111; 1976.

3291 HEPATIC LESIONS IN PRIMARY MYELOSCLEROSIS IN ADULTS. (Fre.) Waitz, R.; Mayer, S.; Mayer, G.; Oberling, F. (67, allee de la Robertsau, 67000 Strasbourg, France). *Rev. Fr. Gastroenterol.* (126):27-31; 1977.

3292 ESSENTIAL REGRESSIVE PELIOSIS OF LIVER. REPORT OF ONE CASE. (Fre.) Duffaud-Thierman, D.; Hecht, Y.; Ragasol, A.; Ferrier, J. P.; Callard, P.; Goldlust, D. M. (Hopital Jean Verdier, avenue du 14 Juillet, F 93140 Bondy, France). *Nouv. Presse Med.* 6(14):1238; 1977.

3293 ERYTHROPOIETIC PROTOPORPHYRIA: I. CLINICAL AND PATHOGENETIC PROBLEMS. (Ger.) Honigsmann, H. (Universitats-Hautklinik, Anichstrasse 35, A-6020 Innsbruck, Austria). *Z. Hautkr.* 52(9):495-509; 1977.

3294 ANOTHER CASE OF REYE'S SYNDROME IN HUNGARY. (Hun.) Foldes, Gy.; Pappert, K.; Pleskott, K. (Orvostovabbkepzo Intezet, II. Gyermekgyogyaszati Klinika, Budapest, Hungary). *Orv. Hetil.* 118(3):148-149; 1977.

3295 LIVER TRANSPLANTATION. (Rus.) Gagua, A. M. (Inst. Experimental Clinical Surgery, Georgian SSR Acad. Sciences, USSR). *Bull. Acad. Sci. Georgian SSR* 84(1):205-208; 1976.

3296 LIVER DISEASE IN RENAL ALLOGRAFT RECIPIENTS. (Jpn.) Akiyama, T. (Osaka Univ. Hosp., Osaka, Japan). *Jpn. J. Urol.* 67(2):107-115; 1976.

3297 NEW PHYSIOLOGICAL REVASCULARIZATION FOR HETEROTOPIC LIVER TRANSPLANTATION. (Fre.) Pouyet, M.; Treboux, M. (Clinique Claude-Bernard, 69600 Oullins, France). *Lyon Chir.* 73(4):308-309; 1977.

3298 PATHOGENESIS OF HEPATIC FAILURE. (Eng.) Popper, H. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *Kidney Int.* 10(Suppl. 7):225-228; 1976.

See also, 2816, 2849, 2854, 2861, 2865, 2937, 2943, 2945, 2946, 2956, 2960, 2961, 2975, 2986, 3012, 3013, 3016, 3017, 3018, 3143, 3155, 3164, 3181, 3300, 3340, 3372, 3426, 3454, 3456, 3461, 3463.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

3299 TREATMENT OF CRIGLER-NAJJAR SYNDROME. (Ger.) Plochl, E.; Hohenwallner, W. (Kinderspital der Landeskrankenanstalten Salzburg, Mullner Hauptstrasse 48, A-5020 Salzburg, Austria). *Wien. Med. Wochenschr.* 128(3):70-73; 1978.

Crigler-Najjar syndrome was diagnosed in a 6-week-old baby girl. Phenobarbital therapy proved to be ineffective. Phototherapy (3,700 lux, 150 W) was effective; it reduced the serum bilirubin level to below 20 mg% by the age of 14 months, but retardation of mental development and of motor function could not be prevented. The findings indicate the importance of early diagnosis of Crigler-Najjar syndrome (before the age of 6 weeks).

3300 MITOCHONDRIAL PATHOLOGY IN THE LIVER IN A PATIENT WITH THE DUBIN-JOHNSON SYNDROME. (Eng.) Enat, R.; Barzilai, D. (Rambam Medical Center, Technion-Israel Inst. Technology, Haifa, Israel). *Isr. J. Med. Sci.* 13(12):1197-1205; 1977.

The mitochondrial pathology of a liver biopsy from a 52-yr-old woman with the Dubin-Johnson syndrome is described. Electron microscopy showed in some hepatocytes an accumulation of typical Dubin-Johnson pigment that was composed of three elements: dark material as broad masses, light areas as fine granules, and homogenous fat-like droplets. Some cells showed dilated smooth endoplasmic reticulum. Although many cells did not show any abnormality, there were cells, mainly those with Dubin-Johnson pigment, with multiple vacuoles (0.4-25.5 μm in diameter) at the vascular poles of the cells. These vacuoles were either fat droplets or, in the majority of cases, included debris composed of sparse fine granular material, clumps of dense material, and multiple membranes. Many of these vacuoles were enclosed by a double membrane. Although many mitochondria appeared normal, there were others that showed disintegration of the matrix with partial to complete loss of mitochondrial cristae, lucent areas, isolated mitochondrial membranes, membranous whorls, and myelin figures. Severe mitochondrial damage as described above has not been reported in the hepatocytes of patients with the Dubin-Johnson syndrome, and it is recommended that mitochondrial damage be looked for in future electron microscopy studies of liver biopsies from patients with the Dubin-Johnson syndrome.

3301 GILBERT'S SYNDROME: THE QUALITATIVE BASIS OF THE DISORDER [Abstract]. (Eng.) Gordon, E. R.; Shaffer, E. A.; Pare, P.; Goresky, C. A. (Montreal General Hosp., Montreal, Quebec, Canada). *Clin. Res.* 25(5):687A; 1977.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

3302 PATHOLOGY AND BIOCHEMISTRY OF PARACETAMOL-INDUCED LIVER DAMAGE. (Eng.) Williams, R.; Davis, M. (King's Coll. Hosp. Medical Sch., London, England). *Proc. Eur. Soc. Toxicol.* 18:27-40; 1977.

Clinical and experimental studies on paracetamol (acetaminophen, *N*-acetyl *p*-aminophenol) overdose and the treatment and prevention of overdoses are reviewed. The effects of a paracetamol overdose vary from a trivial clinical illness to severe

fulminant hepatic failure, which carries a mortality of 80% or higher. In the less severely affected patients, there is necrosis of hepatocytes in the centrilobular areas, while in those who progress to fulminant hepatic failure, wide areas of confluent necrosis are seen. Survival is unlikely if more than 60% of liver cells are necrotic. If the patient survives the acute illness, liver function and structure return completely to normal. Paracetamol overdose produces hepatic necrosis by a direct action on the liver; its effects are dose related. The quantity of paracetamol metabolite bound within the liver, which correlates with the degree of hepatic necrosis, increases in proportion to the rate of urinary excretion of cysteine and mercapturic acid conjugates of the drug, suggesting that hepatic damage from paracetamol is due to overproduction of the reactive precursor of these conjugates. Neither depletion of hepatocellular glutathione nor covalent binding of the reactive paracetamol metabolite will produce hepatocellular necrosis if present singly, but, if they coexist, hepatic damage will ensue. Current treatment depends chiefly upon the administration of compounds that will substitute for hepatic reduced glutathione.

3303 OCCUPATIONAL HEPATOTOXIC SUBSTANCES. (Fre.) Tolot, F. (No affiliation given). *Arch. Mal. Prof. Med. Trav. Secur. Soc.* 36(1/2):199-200; 1977.

3304 INDUSTRIAL HEPATOTOXIC SUBSTANCES. PATHOLOGICAL ANATOMY. (Fre.) Lesbros, F. (No affiliation given). *Arch. Mal. Prof. Med. Trav. Secur. Soc.* 38(1/2):200-205; 1977.

3305 THE LIVER MICROSOMAL SYSTEM: PRACTICAL IMPLICATIONS FOR THE DIAGNOSIS AND PREVENTION OF TOXIC HEPATITIS CAUSED BY TOXIC INDUSTRIAL SUBSTANCES. (Fre.) Prost, G.; Rigaud, M.; Pelletier, N. (Institut universitaire de medecine du travail de Lyon, Lyon, France). *Arch. Mal. Prof. Med. Trav. Secur. Soc.* 38(1/2):225-229; 1977.

See also, 3252.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

3306 VIRAL HEPATITIS RESEARCH LEADING TOWARDS CONTROL BY VACCINATION. (Eng.) Melnick, J. L.; Hollinger, F. B.; Dreesman, G. R. (Baylor Coll. Medicine, Houston, TX 77025). *Arch. Roum. Pathol. Exp. Microbiol.* 35(1/2):5-65; 1976.

Studies that may result in the eventual control of hepatitis viruses A and B by vaccination are reviewed. The physicochemical characteristics of both virus types are discussed, including the composition of the hepatitis virus B particle and its antigenic determinants, collectively termed hepatitis B surface antigen (HBsAg). HBsAg is composed of several distinct antigenic specificities, but antibody to one of them, a group-reactive determinant (a), confers protection against all subtypes. The recently discovered e antigen can be used to determine the infectivity of blood. Anti-e seems to indicate that the blood is noninfectious even if HBsAg is circulating. The results of laboratory tests, including tests for liver function, tests for hepatitis type B and its antigens, and tests for hepatitis type A, and studies of the serological events in hepatitis B infection, virus-host immune reactions, and epidemiology, all contribute to the development of a possible vaccine for future control of hepatitis B. A new concept has developed for producing a virus vaccine: an immunizing antigen can be obtained from healthy carriers, preferably those possessing anti-e antibodies. However, immunization with purified 22-nm whole-particle preparations of HBsAg should be approached with extreme caution. The feasibility of using specific subunits derived from 22-nm HBsAg-containing particles should be investigated as a possible alternative vaccine.

3307 THE EPIDEMIOLOGY OF HEPATITIS B INFECTIONS IN A POLY-ETHNIC POPULATION. (Eng.) Banffer, J. R. J.; Brunings, E. A.; Gielis-Proper, F. K.; Schmitz, P. I. M. (Municipal Lab. for Epidemiological Bacteriology, c/o Public Health Service, P.O. Box 333, Schiedamsedijk 95, Rotterdam, Netherlands). *Am. J. Epidemiol.* 106(6):507-511; 1977.

Blood samples collected from 765 male donors of varying ethnic groups residing in Paramaribo, Surinam were analyzed by radioimmunoassay for hepatitis B surface antigen (HBsAg). Hepatitis B antibodies (anti-HBs) were determined in 738 of the donors. The prevalence of HBsAg in Indian donor subjects of Creole origin, subjects of mixed origin, Bushland Creoles, and Indonesians was 2.9, 3.6, 5.7, 8.1, and 18.6%, resp. If the Indonesians were excluded, there was no statistically significant difference among the other groups as estimated with the Spitz-L test. The difference between those groups and Indonesians was significant ($0.001<p<0.01$). Anti-HBs showed the highest prevalence in Indonesians

(61.3%) and was 34 and 26% in Creoles and Indians, resp. No significant difference was found between these groups if the Indonesians were excluded. Prevalence of anti-HBs in Indonesians was significantly higher than in other ethnic groups ($p<0.001$). The prevalence of HBsAg and anti-HBs in Creoles and mixed groups increased with age. Since a genetic hypothesis of greater prevalence of HBsAg and anti-HBs in Indonesians has previously been ruled out, it is suggested that family clustering in this ethnic group results in a greater exposure risk to hepatitis B virus.

3308 THE PROGNOSTIC SIGNIFICANCE OF THE IN VITRO COMPLEMENT FIXATION IN BIOPSIES OF PATIENTS WITH ACUTE VIRAL HEPATITIS TYPE B [Abstract]. (Eng.) Rizzetto, M.; Bonino, F.; Diana, S.; Verme, G. (Ospedale Mauriziano Umberto I, Torino, Italy). *Digestion* 14(5/6):486-487; 1976.

3309 HEPATITIS B AND ITS SUBTYPES IN A STUDY OF VIRAL HEPATITIS IN WEST LONDON [Abstract]. (Eng.) Sanderson, I. M.; Farrow, L. J.; Lamb, S. G.; Lindon, R. L.; Coghill, N. F.; Clifford, R. E.; *et al.* (West Middlesex Hosp., London, England). *Gut* 18(5, Part 2):A421; 1977.

3310 PREVALENCE OF HEPATITIS B SEROLOGIC MARKERS IN DENTAL HYGIENISTS [Abstract]. (Eng.) James, S. P.; Sampliner, R. E. (Div. Gastroenterology, Univ. Maryland, Baltimore, MD). *Gastroenterology* 72(5, Part 2):1075; 1977.

3311 THE EPIDEMIOLOGY OF HEPATITIS B IN A RESIDENTIAL INSTITUTION FOR THE MENTALLY RETARDED. (Eng.) Boughton, C. R.; Hawkes, R. A.; Schroeter, D. R.; Harlor, J. A. (Prince Henry Hosp., Little Bay, New South Wales 2036, Australia). *Aust. N.Z. J. Med.* 6(6):521-529; 1976.

3312 TYPE B AND NON-B HEPATITIS IN JERUSALEM. (Eng.) Sandler, S. G.; Shouval (Steigbuegel), D.; Marcus, M.; Eliakim, M. (Hadassah Univ. Hosp., Jerusalem, Israel). *Bull. W.H.O.* 54 (2):193-198; 1976.

3313 SOLID-PHASE ENZYME IMMUNOASSAY FOR HEPATITIS B SURFACE ANTIGEN. (Eng.) Wei, R.; Knight, G. J.; Zimmerman, D. H.; Bond, H. E. (Electro-Nucleonics Lab. Inc., 4809 Auburn Ave., Bethesda, MD 20014). *Clin. Chem.* 23(5):813-815; 1977.

3314 A TRICHROME STAIN FOR THE DETECTION OF HEPATITIS B SURFACE ANTIGEN IN LIVER BIOPSIES. (Eng.) Gubetta, L.; Rizzetto, M.; Verme, G. (Ospedale Mauriziano Umberto I, Torino, Italy). *Pathologica* 68(983/984):413-416; 1976.

3315 ENHANCED ANTI-HBs PRODUCTION IN THE PATHOGENESIS OF FULMINANT HEPATITIS B [Abstract]. (Eng.) Woolf, I. L.; Shiekh, N. E. L.; Cullens, H.; Zuckerman, A. J.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 14(5/6):556; 1976.

3316 DISTINCTIVE INTRAHEPATIC DISTRIBUTION OF HBs AND HBc ANTIGENS IN PATIENTS WITH ACUTE AND CHRONIC HEPATITIS B [Abstract]. (Eng.) Ray, M. B.; Desmet, V. J. (Departement Medische Navorsing, Academisch Ziekenhuis Sint Rafael, Leuven, Belgium). *Digestion* 14(5/6):459; 1976.

3317 SERUM ANTI-HBc TITERS IN CHRONIC LIVER DISEASE [Abstract]. (Eng.) Hadziyannis, S. J.; Karvountzis, G. G. (Second Dept. Medicine, Athens Univ., Athens, Greece). *Digestion* 14(5/6): 460; 1976.

3318 ANTI-HBc TITERS, DNA POLYMERASE AND INTRAHEPATOCELLULAR HBcAg IN ASYMPTOMATIC HBsAg CARRIERS [Abstract]. (Eng.) Arnold, W.; Purcell, R. H.; Hess, G.; Knolle, J.; Meyer zum Buschenfelde, K. H. (Second Dept. Internal Medicine, Johannes Gutenberg Univ. Mainz, Mainz, W. Germany). *Digestion* 14(5/6):459-460; 1976.

3319 A PROSPECTIVE STUDY OF e-Ag AND ANTI-e HEPATITIS B [Abstract]. (Eng.) Schulman, A. N.; Fagen, N. D.; Morton, D. L.; Gitnick, G. L. (Univ. California, Los Angeles CA). *Gastroenterology* 72(5, Part 2):1128; 1977.

3320 IS e-SYSTEM A PREDICTOR OF CHRONIC ACTIVE LIVER DISEASE IN CARRIERS [Abstract]? (Eng.) Feinman, S. V.; Berris, B.; Sinclair, J. C.; Wrobel, D. M. (Mount Sinai Hosp., Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1186; 1977.

3321 T LYMPHOCYTE MEDIATED CYTOTOXICITY IN HBsAG POSITIVE LIVER DISEASE: DEVELOPMENT OF A NEW ASSAY [Abstract]. (Eng.) El Sheikh, N.; Osman, C. G.; Cullens, H.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp., London, England). *Gut* 18 (5):A402-A403; 1977.

3322 ESSENTIAL MIXED CRYOGLOBULINEMIA: ANOTHER CONNECTIVE TISSUE DISORDER ASSOCIATED WITH HEPATITIS B VIRUS INFECTION [Abstract]. (Eng.) Tobias, H.; Levo, Y.; Franklin, E. (New York Univ. Sch. Medicine, New York, NY). *Gastroenterology* 72 (5, Part 2):1186; 1977.

3323 THE PROBABLE SIGNIFICANCE OF HYPERTRIGLYCERIDAEMIA IN VIRAL HEPATITIS. (Eng.) Aiyathurai, J. E. J.; Sentheshanmuganathan, S. (Dept. Pediatrics, Univ. Singapore, Singapore). *Aust. N.Z. J. Med.* 6(6):529-532; 1976.

3324 USE OF LIPOIC ACID IN THE COMPLEX TREATMENT OF PATIENTS WITH VIRAL HEPATITIS. (Ukr.) Loginova, N. S.; Mallina, E. R.; Usmanov, D. U. (Second Dept. Childhood Infections, Central Asiatic Medical Inst. Pediatric Medicine, USSR). *Pediatr. Akush. Ginekol.* (6):19-20; 1976.

3325 INCREASED FOLATE EXCRETION IN ACUTE HEPATITIS [Letter to Editor]. (Eng.) Tamura, T.; Stokstad, E. L. R. (Dept. Nutritional Sciences, Univ. California, Berkeley, CA 94720). *Am. J. Clin. Nutr.* 30(9):1378-1379; 1977.

3326 PROSPECTIVE STUDY IN POSTTRANSFUSION HEPATITIS IN PATIENTS WITH OPEN HEART SURGERY. (Ger.) Sugg, U.; Frosner, G. G.; Schneider, W.; Stunkat, R. (Chirurgische Universitats-Klinik, Calwerstrasse 7, D-7400 Tubingen, W. Germany). *Klin. Wochenschr.* 54(23):1133-1136; 1976.

3327 HBsAg, ALCOHOL, AND SYPHILIS [Letter to Editor]. (Eng.) Motoki, T.; Murao, S. (Second Dept. Internal Medicine, Tokyo Univ., Tokyo, Japan). *Lancet* 2(8034):404; 1977.

3328 INFECTIOUS HEPATITIS WITH EXCESSIVE HYPERBILIRUBINEMIA AND A HEMOLYTIC CRISIS IN AN 8-YEAR-OLD BOY. HIS G6PD DEFICIENCY WAS AN AGGRAVATING FACTOR. (Eng.) Fried, D.; Gotlieb, A.; Roitman, A. (Zahalon Government Hosp., Jaffa, Israel). *Clin. Pediatr.* 16(5):482-483; 1977.

See also, 2960, 2961, 3018, 3397, 3425.

LIVER AND BILIARY TRACT

Chronic Hepatitis

3329 PATHOGENETIC ASPECTS AND IMMUNOSUPPRESSIVE TREATMENT OF CHRONIC ACTIVE HEPATITIS. (Ita.) Miglio, F.; Facchini, A.; Stefanini, G. F.; Mariani, E.; Gasbarrini, G. B.; Labo, G. (Istituto di Clinica Medica e Gastroenterologia, Universita, Bologna, Italy). *Recent. Prog. Med. (Roma)* 62(4): 471-488; 1977.

The results of therapeutic trials with immunosuppressive drugs in the treatment of chronic active hepatitis are reviewed, and the preliminary results of a recent trial are presented. Prednisolone (15 mg/day) and azathioprine (75 mg/day) were compared in one trial in 47 patients. The findings demonstrated the higher effectiveness of prednisolone; it produced a greater reduction of the gamma-globulin level, lower incidence of esophageal varices, and a 2-yr survival rate of 95% (versus 72% in the azathioprine-treated group). New trials are being conducted with prednisolone (30 mg/day for 30 days, then 15 mg/day continuously), azathioprine (100 mg/day), and their combination (50 mg azathioprine plus 15 mg/day prednisolone for 30 days, then maintenance therapy with the same azathioprine dose plus 7.5 mg/day doses of prednisolone). The preliminary results indicate a good correlation between the lymphocytotoxicity test and the indices of necrosis, and parallel reduction of the cytotoxicity and of the SGOT level during the therapy.

3330 TREATMENT OF HBsAg-POSITIVE CHRONIC ACTIVE HEPATITIS WITH HUMAN FIBROBLAST INTERFERON [Abstract]. (Eng.) Kingham, J. G.; Ganguly, N. K.; Shari, Z. D.; Mendelson, R.; Cartwright, T.; Scott, G. M.; *et al.* (Southampton General Hosp., Southampton, England). *Digestion* 16(4):358; 1977.

3331 LEVAMISOLE IN THE TREATMENT OF HBs ANTIGEN-POSITIVE CHRONIC ACTIVE LIVER DISEASE [Abstract]. (Eng.) Thomas, H. C.; Chadwick, G.; Jain, S.; Sherlock, S. (Royal Free Hosp., Hampstead, London, England). *Digestion* 16(4):358; 1977.

See also, 2961, 3252, 3308, 3316, 3317, 3321.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

3332 ROUTINE DIAGNOSIS AND THERAPY OF FATTY DEGENERATION OF THE LIVER. (Ger.) Gunthner, W.; Dandl, M. (Medicus-Haus1, 8240 Schonau, W. Germany). *Therapiewoche* 27(35):6084-6086, 6089; 1977.

Ten patients with fatty degeneration of the liver were placed on low-carbohydrate diets with abstinance from alcohol and they received betaine citrate (15 g/day during the first month, 7.5 g/day during the following 3 months). Fatty liver,

diagnosed bioptically, was due to chronic alcohol abuse in eight cases, and to hyperalimentation in two. Four patients had hepatomegaly before the treatment, and the gamma-glutamyl level, measured in seven cases, was 16-163 U/l. Three patients lost weight considerably, and thus they were assumed to have kept the diet and abstained from alcohol, while these events are questionable in the other cases. The blind liver biopsy performed after the 4-month treatment revealed considerable reduction of the fat incorporation in the liver; the fat content dropped to 10% or less in eight cases. No hepatomegaly was seen. The results of the laboratory tests were largely contradictory, but the gamma-glutamyl level showed a reduction. The findings indicate the value of blind liver biopsy in the follow-up of fatty liver.

3333 HEPATIC MAMMALIAN COLLAGENASE: DEVELOPMENT OF AN ASSAY AND DEMONSTRATION OF INCREASED ACTIVITY AFTER ETHANOL CONSUMPTION [Abstract]. (Eng.) Okazaki, I.; Feinman, L.; Lieber, C. S. (Bronx Veterans Admin. Hosp., Bronx, NY). *Gastroenterology* 73(5):1236; 1977.

3334 ALCOHOLIC LIVER DISEASE (ALD) PRESENTING WITH MARKED HYPERPHOSPHATASEMIA: A COMBINED CLINICAL AND PATHOLOGICAL EVALUATION [Abstract]. (Eng.) Perrillo, R.; Lander, J.; Griffen, R.; DeSchyrver, K.; Zuckerman, G. (Washington Univ. Sch. Medicine, St. Louis, MO). *Gastroenterology* 73(5):1239; 1977.

3335 EFFECT OF PROPYLTHIOURACIL IN TREATMENT OF ALCOHOLIC LIVER DISEASE [Abstract]. (Eng.) Orrego, H.; Kalant, H.; Israel, Y.; Medline, A.; Rankin, J.; Findlay, J.; *et al.* (Addiction Res. Foundation, Univ. Toronto, Toronto, Ontario, Canada). *Gastroenterology* 73(5):1237; 1977.

See also, 2642, 2779, 2832, 2961, 3223, 3252, 3254.

LIVER AND BILIARY TRACT

Cirrhosis

3336 ORAL CHOLATE TOLERANCE TEST--AN APPLICATION OF SPECIFIC RADIOIMMUNOASSAYS FOR THE DETERMINATION OF SERUM-CONJUGATED CHOLIC AND DEOXYCHOLIC ACIDS. (Eng.) Matern, S.; Haag, M.; Hans, C.; Gerok, W. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12, October 1976.* (Baltimore, Md.: University Park Press): 253-261; 1977.

The kinetics of serum conjugated cholic and deoxycholic acids were determined using specific radioimmunoassays in an oral cholate tolerance test to investigate the dynamics of the enterohepatic circulation of cholic acid in health and disease. In nine healthy volunteers, cholate administration (0.5 g p.o.) caused an elevation of peripheral serum conjugated cholic acid levels. In 10 cirrhotic patients without portal hypertension, the same dose caused a slightly higher increase of serum conjugated cholic acid than in the healthy volunteers. Cirrhotic patients with portal hypertension, however, had a marked elevation of serum conjugated cholic acid levels within the first hour after p.o. cholate administration. The kinetics of serum conjugated cholic acid in cirrhotic patients with portal hypertension showed a biphasic rise, with the second peak ascribed to the reabsorption of the cholate. The second peak reflects, therefore, a disturbed gallbladder function. In healthy volunteers, there were no changes of serum conjugated deoxycholic acid levels over a 5-hr period; in cirrhotic patients with portal hypertension, a very small part of the cholic acid was metabolized to deoxycholic acid during the enterohepatic circulation as demonstrated by a slight increase of serum conjugated deoxycholic acid levels over a 5-yr period. Changes in the levels of serum bile acids appear to reflect the dynamics of the enterohepatic circulation.

3337 SPLENOPORTOSCINTIGRAPHY: RESULTS IN 213 CASES. (Fre.) Vinot, J. M.; Paraf, A.; Syrota, A.; Desgrez, A. (Centre Hospitalo-Universitaire de Bicetre, F 94270 Le Kremlin Bicetre, France). *Ann. Med. Interne (Paris)* 128(12):917-921; 1977.

Splenoportoscintigraphic tests were performed in 213 patients, including 12 with hepatosplenic diseases, 23 with isolated splenomegaly, 18 with generalized diseases with hepatosplenic involvement, 11 with pancreatic diseases, 124 with cirrhosis (including 2 with biliary cirrhosis), 18 with portacaval shunt, 5 with fibrosteatosis, and 2 with cavernomas. Following the i.v. injection of ^{99m}Tc-labeled colloidal sulfur, the center of the spleen was marked, and ^{99m}Tc-labeled human albumin (1 mCi) and ^{99m}Tc-labeled RBC (12 mCi) were injected into the spleen. The scintigraphic test was a total failure in 8 cases due to the absence of any tracer migration and a partial failure in 13 cases due to the absence of the migration of one tracer. Hemoperi-

toneum prompted splenectomy 24 hr after the test in one case. In the evaluable cases, it was possible to determine the permeability of the anastomosis in portacaval shunt, and to obtain morphological and hemodynamic data. Umbilical reflux was found in 20/124 cirrhotic patients, and total spontaneous splenocaval shunt was found in 14/124 cases. The findings indicate the value of the splenoporto-scintigraphic test in the diagnosis of morphological and hemodynamic disorders in the portal circulation.

3338 MECHANISM OF HYPOGONADISM IN CIRRHOTIC MALES. (Eng.) Green, J. R. B. (St. Bartholomew's Hosp., London, England). *Gut* 18(10): 843-853; 1977.

Recent studies on the mechanism of hypogonadism and feminization in cirrhotic males are reviewed. Associated with the clinical signs of hypogonadism and overt feminization in cirrhotic males is a reduced production of testosterone along with a low plasma testosterone concentration. Recent studies have failed to show significant changes in the hepatic metabolism of biologically potent estrogens in cirrhotic men, and there is no clear evidence of increased circulating concentrations of estrogens in cirrhotic men. Alcohol consumption appears to play no specific role in the endocrine changes of established cirrhosis, since these changes are seen equally in nonalcoholic cirrhotics. In noncirrhotic men, both short-term and chronic consumption of alcohol induce a variety of biochemical effects on sex hormone metabolism; many of the endocrine consequences of alcohol consumption in noncirrhotics may result from changes in the hepatic synthesis of sex hormone binding globulin. The pathogenesis of endocrine changes in cirrhotic men may be multifactorial, e.g., a combination of decreased hepatic clearance of some estrogenic compounds, an autoimmune-mediated primary testicular defect, and a specific potentiation effect by alcohol. Alternatively, none of these suggested mechanisms may be of importance, and the endocrine changes seen in cirrhotic males may be mediated by other undiscovered or unconsidered mechanisms.

3339 SERUM POLYAMINE AND OCTOPAMINE CHANGES FOLLOWING PARTIAL HEPATECTOMY AND PORTACAVAL SHUNT. (Eng.) Monson, R. C.; Rodgers, B. M.; Garnica, A. D.; Talbert, J. L. (Dept. Surgery, Univ. Florida, Gainesville, FL). *J. Pediatr. Surg.* 12(6):1079-1084; 1977.

The effect of portal blood flow on liver regeneration was studied to determine the factors influencing hepatic regeneration following major hepatic resection. An end-to-side portacaval shunt was performed in a 5-yr-old boy to relieve splanchnic congestion resulting from interruption of the portal vein due to complete resection of the right lobe of the liver. Serial liver scans demonstrated that the right lobe was completely regenerated by 6 weeks postoperatively. Throughout the postoperative period, the patient was maintained on a high-protein diet without clinical evidence of hepatic encephalopathy. Serum ammonia and octopamine levels showed early mild elevations (32-90 µg/dl and 1.0-4.0 ng/dl compared to normal values of 18-48 µg/dl and 0.72-1.92 ng/dl, resp.), reaching maxima at 10-12 weeks and returning to normal limits by 20 weeks. Serum polyamine levels provided biochemical evidence of regeneration: an early rise, at 1-4 weeks, in the serum spermidine level (corresponding to the proliferative phase of rapid hepatocyte regeneration) was followed by a large elevation in serum spermine level, which began at 4-5 weeks, and is inversely related to hepatocyte growth and corresponds to the maturation phase of regeneration. The significance of polyamines as regulatory molecules is discussed; they appear to be useful markers for assessing hepatic regeneration. Serial determination of octopamine as an indicator of hepatic encephalopathy is proposed and discussed.

3340 A BALLOON CATHETER TECHNIQUE FOR THE MEASUREMENT OF HEPATIC VEIN WEDGE PRESSURE (HVWP) AND GRADIENT [Abstract]. (Eng.) Groszmann, R. J.; Blei, A.; Kniaz, J.; Storer, E.; Conn, H. O. (Veterans Admin. Hosp., West Haven, CT). *Gastroenterology* 72(5, Part 2):1177; 1977.

3341 CYSTOMETRIC STUDIES IN LIVER CIRRHOSIS [Abstract]. (Eng.) Reddy, A. N.; Grosberg, S. J.; Wapnick, S.; Abrahams, J. (Veterans Admin. Hosp., Brooklyn, NY). *Gastroenterology* 72 (5, Part 2):1117; 1977.

3342 RELATIONSHIP BETWEEN THE HEPATIC SINUSOIDAL PRESSURE AND THE RENIN-ANGIOTENSIN-ALDOSTERONE SYSTEM IN CIRRHOSIS WITH ASCITES [Abstract]. (Eng.) Bosch, J.; Arroyo, V.; Mauri, M.; Mas, A.; Carrilho, F.; Betriu, A.; Rodes, J. (Hospital Clinico y Provincial, Barcelona, Spain). *Digestion* 14(5/6):472-473; 1976.

3343 IDIOPATHIC (HYPERKINETIC) PORTAL HYPERTENSION--THE ARGUMENT FOR EXTRAHEPATIC CAUSE, AND TREATMENT BY SPLENECTOMY [Abstract]. (Eng.) Langer, B.; Taylor, B. R.; Colapinto, R. M. (Dept. Surgery, Univ. Toronto, Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1086; 1977.

3344 CORRECTION OF ANTIDIURESIS AND SODIUM RETENTION BY DEMECLOCYCLINE IN PATIENTS WITH INTRACTABLE ASCITES AND OEDEMA [Abstract]. (Eng.) Poupon, R.; Gustot, P.; Darnis, F. (Hopital Saint-Antoine, Paris, France). *Digestion* 14 (5/6):472; 1976.

3345 ASSESSMENT OF THE RISK OF PORTACAVAL ANASTOMOSIS IN LIVER CIRRHOSIS [Abstract]. (Eng.) Gauthier, A.; Cros, R. C.; Assadourian, R.; Di Costanzo, J. (Hopital Sainte-Marguerite, Marseille, France). *Digestion* 15(5):A440-A441; 1977.

3346 A PROSPECTIVE RANDOMIZED TRIAL OF THE DISTAL SPLENORENAL (WARREN) SHUNT--A PRELIMINARY REPORT [Abstract]. (Eng.) Langer, B.; Patel, S.; Stone, R. M. (Dept. Surgery, Univ. Toronto, Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1086; 1977.

3347 A DOUBLE-BLIND CONTROLLED STUDY USING D-PENICILLAMINE IN CHRONIC CHOLANGIOLITIC HEPATITIS (PRIMARY BILIARY CIRRHOSIS) [Abstract]. (Eng.) Dickson, E. R.; Fleming, C. R.; Geall, M. G.; McCall, J. T.; Baggenstoss, A. H. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(5, Part 2): 1049; 1977.

3348 SUPPLEMENTAL VITAMIN A IN CIRRHOTICS: REVERSAL OF ABNORMAL DARK ADAPTATION AND EFFECTS ON THE RETINOL TRANSPORT SYSTEM [Abstract]. (Eng.) Russell, R. M.; Morrison, S. A.; Smith, F. R. (Veterans Admin. Hosp., Baltimore, MD). *Gastroenterology* 72(5, Part 2):1124; 1977.

3349 ASSESSMENT OF MORPHOLOGIC RESPONSE TO 25-OH VITAMIN D (25-OH D) THERAPY IN PATIENTS WITH PRIMARY BILIARY CIRRHOSIS (PBC) [Abstract]. (Eng.) Reed, J. S.; Meredith, S. C.; Nemchausky, B. A.; Rosenberg, I. H.; Boyer, J. L. (Dept. Medicine, Univ. Chicago, Chicago, IL). *Gastroenterology* 72(5, Part 2):1181; 1977.

3350 INTESTINAL ABSORPTION OF 25-HYDROXYVITAMIN D AND OSTEOMALACIA IN PRIMARY BILIARY CIRRHOSIS [Abstract]. (Eng.) Compston, J.; Thompson, R. P. H. (St. Thomas' Hosp., London, England). *Gut* 18(5):A401; 1977.

3351 ABNORMAL VITAMIN D METABOLISM IN CIRRHOSIS [Abstract]. (Eng.) Jung, R. T.; Davie, M.; Hunter, J. O.; Chalmers, T. M. (Addenbrooke's Hosp., Cambridge, England). *Gut* 18(5):A401; 1977.

See also, 2916, 2939, 2960, 2961, 3155, 3252, 3257, 3289, 3298, 3327.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

3352 COMPLICATIONS OF ENDOSCOPIC SPHINCTEROTOMY. (Eng.) Liguory, C.; Girault, F.; Coffin, J. C. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, France, 8-9 June 1976.* (Basel: S. Karger): 232-239; 1977.

Complications of endoscopic sphincterotomy encountered in several series of patients are discussed. Hemorrhage is the chief complication of this procedure, occurring in 24/624 operations in three separate series. Acute pancreatitis represents 1.6% of complications of endoscopic sphincterotomy. Two kinds of infectious complications may occur: cholangitis and cholecystitis (when the gallbladder has been left). Perforation, generally retroperitoneal, was seen in 1.2% of cases. Blocking was observed in three cases and resulted from an insufficiently large sphincterotomy for the size of the stone. Although insufficient time has elapsed since the introduction of this technique to evaluate later complications, two risks are considered possible, secondary papillary stenosis and duodenal-biliary reflux. Some mishaps occurring with surgical sphincterotomy do not occur with endoscopy, e.g., complications associated with general anesthesia and surgery. Acute pancreatitis occurs after endoscopic sphincterotomy but is much less severe than after surgery. It is concluded that the risks of endoscopic sphincterotomy should not overshadow its benefits.

3353 EXPERIENCE WITH ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATICOGRAPHY. (Nor.) Ruud, T. E.; Rosseland, A.; Thorsen, G. (Telemark Sentralsjukehus, Kirurgisk avdeling, Skien, Norway). *Tidsskr. Nor. Laegeforen.* 97(33):1732-1735; 1977.

Experience with endoscopic retrograde cholangiopancreaticography (ERCP), performed in 133 patients on 155 occasions, is presented. Cannulation of the ampulla of Vater and contrasting of at least one duct system was possible in 89% of all cases. Cannulation was not possible in 29 cases, because the ampulla was not found, it was hidden in a duodenal diverticulum, or destroyed by tumor infiltration. Postcholecystectomy syndrome; suspect tumor of the bile ducts, pancreas, or duodenum; papillotomy, extrahepatic cholestatic jaundice; and examination after pancreatitis were the indications for ERCP. It was possible to visualize the pancreas in 85%, the bile ducts in 82%, and both systems in 70% of the cases. During visualization of the common bile duct, stone in the common bile duct was found in 21 cases, stone in the gallbladder in 9, dilated bile ducts in 30, stricture in 9, and no change in 34. The pancreas, visualized in 61 cases,

showed chronic pancreatitis in 11 cases, pancreatic tumor in 5, tumor in the region of the ampulla of Vater in 1, and no change in 44 cases. The complications of ERCP occurred in 5% of the cases and included mild pancreatitis (3 cases), cholangitis (2), cardiac infarction (1), and fatal perforation of the common bile duct (1). ERCP was most useful in extrahepatic cholestasis. The examination helped establish the indication of surgery or spare the patient from surgery. A remarkably high incidence of pathological processes was found in patients with duodenal diverticulum. The findings indicate the great diagnostic value of ERCP.

3354 CLINICAL INVESTIGATIONS ON THE CHOLERETIC FEBUPROL. (Ger.) Scholing, W. E.; Weinert, W. (Kreuzbergpromenade 13 A, A-5020 Salzburg, Austria). *Munch. Med. Wochenschr.* 120(5):143-146; 1978.

The choleretic agent Febuprol (3-butoxy-1-phenoxypropanol-[2]) was studied in 50 outpatients with cholecystopathy in a double-blind cross-over trial. Postcholecystectomy syndrome was diagnosed in 43 patients, chronic cholecystitis in 5, and cholecystopathy of unknown genesis in 2. Some patients received three capsules daily for 14 days, others received placebo, after which the drugs were switched. The therapeutic effectiveness was evaluated on the basis of a grade system, using feeling of fullness, pressure in the upper abdomen, meteorism, obstipation, flatulence, and postprandial nausea as criteria. The reduction of the intensity of these symptoms ranged from 0% (postprandial nausea) to 21.7% (flatulence) in the placebo group, while it ranged from 21.4% (meteorism) to 83.3% (postprandial nausea) in the Febuprol-treated group. The differences were statistically significant ($p<0.01$-0.05). The findings indicate the therapeutic effectiveness of Febuprol in cholecystopathy.

3355 GALLSTONE DISEASE: PATHOGENESIS AND MANAGEMENT. (Eng.) Shaffer, E. A.; Small, D. M. (McGill Univ., Montreal, Canada). *Curr. Probl. Surg.* 13(7):1-72; 1976.

The pathogenesis and treatment of gallstone disease, which accounts for 5,000-8,000 deaths per year, is reviewed. Gallstones are definitely associated with certain clinical factors such as pancreatitis, carcinoma of the gallbladder, chronic ileal disease, and obesity. Probable associations have been established for diet, atherosclerosis, hyperlipidemia, diabetes mellitus, peptic ulcer, and gastric surgery. There are two classes of gallstones, cholesterol and bile pigment gallstones. Pigment gallstones may be formed by secretion of an abnormal pigment that readily precipitates in bile, excessive hepatic secretion of a normal pigment that surpasses its solubility in bile, or extrahepatic conversion of a normal constituent into an insoluble precipitate. There are at least six categories of pathophysiologic abnormalities that can lead to abnormal bile and ultimately to cholesterol gallstones: 1) excessive bile salt loss, 2) oversensitive bile acid feedback, 3) excessive cholesterol secretion, 4) rapid bile salt circulation with decreased pool size, 5) a mixed defect that is a combination of types 1 and 2, and 6) primary disorders of the gallbladder, ducts, or sphincters. The definitive treatment of gallstones is surgery, but therapeutic agents are being used (chenodeoxycholic acid, phenobarbital) and actively investigated (lecithin, α-glycerophosphate).

3356 DISTURBANCES IN GASTRIC EMPTYING IN GALLSTONE PATIENTS. (Ger.) Otten, G.; Helwing, E.; Lux, M. (Klinik fur Allgemeinchirurgie, Medizinische Hochschule, Podbielskistrasse 380, D-3000 Hannover 51, W. Germany). *Wien. Med. Wochenschr.* 127(24):741-742; 1977.

Gastric emptying was studied in 35 patients with cholelithiasis during symptom-free intervals. Gastric juice analysis revealed normal values in all cases. Gastric emptying was assessed from the exhalation of radioactive carbon dioxide following the administration of a test meal (low-fat cottage cheese mixed with ^{14}C-labeled glutaminic acid, 15 μCi). The $^{14}CO_2$ exhalation was significantly higher in normal subjects than in the patients with cholelithiasis (4,000-5,000 counts/min versus about 2,000 counts/min, resp.). These changes are interpreted as an expression of disturbances in gastric motor functioning. The findings indicate retarded gastric emptying in patients with cholelithiasis even during asymptomatic intervals.

3357 CHOLELITHIASIS IN CHILDREN AND ADOLESCENTS. (Ger.) Gotz, M.; Granditsch, G.; Helmer, F.; Howanietz, L.; Wagner, I. U. (Universitats-Kinderklinik Wien, Wahringer Gurtel 74-76, A-1090 Vienna, Austria). *Wien. Klin. Wochenschr.* 89(20): 686-690; 1977.

Cholelithiasis was found in 10 children and adolescents (2 boys, 8 girls, aged 11-20 yr) during a 19-yr-period. The length of the anamnesis ranged from 5 days to 6 yr, averaging about 2 yr. The symptoms included abdominal pains and disorders in all cases, tenderness in the right upper quadrant in eight, and jaundice in four. Predisposing conditions were found in five cases: spherocytosis in three and familial cholecystopathy in two. The serum bilirubin level, determined in nine cases, was in the normal range in six. The other laboratory tests were not conclusive. Cholelithiasis was diagnosed by x-raying in six cases, and by oral cholecystography or i.v. cholangiography in the others. Cholecystectomy was performed in all cases; the postoperative course was uneventful in nine cases, one patient developed localized peritonitis. Multiple gallstones and signs of chronic cholecystitis were found in all cases. Cholecystectomy should be performed in all gallstone patients, even in the absence of symptoms.

3358 PROGRESS REPORT: NON-SURGICAL REMOVAL OF COMMON BILE DUCT STONES. (Eng.) Classen, M.; Ossenberg, F. W. (General Hosp. Hamburg-Barmbek,

Rubenkamp 148, D 2000 Hamburg 60, W. Germany). *Gut* 18(9):760-769; 1977.

Common bile duct stones that have been overlooked during surgery may be disclosed after operation by cholangiographic follow-up examinations via the T-tube. The T-tube permits probes and snares to be introduced to remove the stones mechanically under radiological or endoscopic control. It also allows the stones to be irrigated with a solvent for cholesterol (cholic acid being commonly used) or with substances that permit them to be fragmented, e.g., heparin. The removal of common bile duct stones has also been performed using endoscopic papillotomy. Of the more than 1,100 endoscopic papillotomies performed for the removal of stones in the common bile duct, 89% were successful. Complications such as pancreatitis, perforation, bleeding, and septic cholangitis were observed in 94/1,107 patients. The risk of septic cholangitis increased with the size and eventual impaction of the common duct stone; the risk of bleeding seemed to be correlated with the length of the incision and the size of the stone. Indications for endoscopic papillotomy are isolated papillary stenosis, common bile duct stones that were overlooked during surgical operations or are newly formed, and stones with symptoms of obstruction in patients at high risk for surgery.

3359 DIFFERENCES IN RENAL EXCRETION BETWEEN GLYCO-, TAUROCONJUGATES, SULFOCONJUGATES AND GLUCURONOCONJUGATES OF BILE ACIDS IN CHOLESTASIS. (Eng.) Back, P.; Gerok, W. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 93-100; 1977.

The renal excretion of bile acids was studied in 109 patients. Bile acid conjugates were separated into three major groups: glyco-, tauroconjugates, sulfoconjugates, and glucuronoconjugates. Within these groups, the six major bile acids occurring in plasma and urine were determined separately. The glyco-, tauroconjugates were excreted into urine up to limit values, which were not surpassed even at high plasma concentrations. Excretion of sulfoconjugates, however, correlated linearly with plasma concentration, making it possible to calculate clearance values for these derivatives, which approximate maximum rates. This finding may also be true for glucuronoconjugates of chenodeoxycholic acid and 3β-hydroxy-5-cholenoic acid, if larger numbers of patients are being investigated. Based on the differences of renal clearances of the different groups of conjugates, it is hypothesized that bile acids enter the urine by diffusion processes only.

3360 LONG-TERM RESULTS OF PAPILLOSTOMY. (Eng.) Stefanini, P.; Carboni, M.; De Bernardinis, G.; Negro, P. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, France, 8-9 June 1976.* (Basel: S. Karger): 206-212; 1977.

A follow-up study was conducted on 577 patients who had had a papillostomy (sphincteroplasty) at least 1 yr before to determine the therapeutic long-term results of the procedure. The indications for surgery had been common duct lithiasis (338), secondary papillitis (193), primary papillitis (34), and chronic pancreatitis (12). The study was conducted by questionnaire and, in 160 cases, by clinical examination also. Good results, i.e., absence of symptoms of pain or dyspepsia relative to the biliary tract or pancreas, were obtained in 97% of the patients. The pathological conditions causing failures (17) were residual or recurrent stones (9 cases), papillary stenosis (6), cholangitis from reflux (1), and chronic recurrent pancreatitis (1). A number of the failures were caused by operating for the wrong indications. However, these mistakes were made 10 yr ago, when the diagnostic methods that today markedly reduce the incidence of wrong indications for operation were not available. It is concluded that papillostomy, performed with the correct indications, can cure the condition for which it is applied.

3361 BILIRUBIN METABOLISM AND JAUNDICE. (Eng.) Robinson, S. H. (Beth Israel Hosp., Boston, MA). *Pathobiol. Annu.* 6:299-316; 1976.

Normal and defective pathways of bilirubin metabolism are reviewed. Hyperbilirubinemia may be caused either by overproduction or impaired excretion of bilirubin. The most common cause of over-production jaundice is an increased rate of hemoglobin catabolism in hemolytic disorders. An increase in the erythropoietic bilirubin fraction occurs under two conditions: 1) with physiologically regulated erythroid hyperplasia and 2) with pathologic ineffective erythropoiesis (destruction of immature erythroid cells in or soon after leaving the marrow). Causes of impaired bilirubin excretion include defects in hepatic uptake, conjugation, secretion, and/or canalicular function, and extrahepatic obstruction. In acute hepatitis and chronic liver disease, multiple defects in bilirubin metabolism and excretion contribute to hyperbilirubinemia. Despite multiple reasons for unconjugated hyperbilirubinemia, a large portion of the serum bilirubin is typically of the conjugated type in patients with acquired liver damage. This finding appears to be a result of the vulnerability to injury of the secretory pathway as well as obstruction of bile radicles by architectural distortion and edema.

3362 PRIMARY AND SECONDARY CHRONICAL ODDITIS. (Eng.) Laurent, J.; Floquet, J.; Guibal, F.; Watrin, B.; Vosse, A. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, France, 8-9 June 1976.* (Basel: S. Karger): 131-136; 1977.

The diagnosis and treatment of chronic odditis is discussed. Odditis is defined as any state of obstruction of the choledocho-Wirsung junction in conjunction with anatomic fiber inflammation of the papilla and Oddi's sphincter. Cases of primary odditis are extremely rare, found in conjunction

with pancreatitis or, more frequently, with lithiasis. Clinical observation, pressure tests, and radiography are necessary for diagnosis; the symptoms are presence of biliary pain and, sometimes, presence of jaundice. Pressure tests are mainly carried out during the operation, but duodenoscopy now makes it possible to perform miniaturized pressure tests without surgery. Radiographic indications of odditis are: 1) dilatation of the main biliary duct, 2) absence of evacuation, and 3) absence of Oddi movement. The last sign is the most reliable and can be studied better by using radiocinema than by conventional radiography. Medical treatment is reserved to cases of anorganic Oddi hypertonicity without lithiasis. Surgery should be used only on rare occasions. An elementary dilatation without duodenotomy may frequently be sufficient. Endoscopic sphincterotomy should be reserved to odditis after cholecystectomy with or without choledocholithiasis.

3363 SIGNIFICANCE OF DEBRAY'S TEST (CHOLERETIC MORPHINE TEST) AND SIMULTANEOUS ENZYME TESTS IN THE DIAGNOSIS OF DYSKINESIA OF THE SPHINCTER OF ODDI. (Hun.) Szollosi, G.; Pap, A.; Dobronte, Z.; Varro, V. (I. Belgyogyaszati Klinika, Szegedi Orvostudomanyi Egyetem, Szeged, Hungary). *Orv. Hetil.* 119(3):139-141; 1978.

The diagnostic value of the choleretic morphine test (Debray's test) was studied in 89 patients with dyskinesia of the hypertonic sphincter of Oddi. Fifty-seven patients had undergone cholecystectomy several years previously. The SGOT, gamma-glutamyl transpeptidase (gamma-GT), and serum and urine diastase levels were also determined before and 1-6 hr after the test in 72 patients. Twenty-eight of the 57 cholecystectomized patients were found to be Debray-positive, and 27 were Debray-negative; the test was not evaluable in 2 patients. Positive tests were found in 3 of the 32 noncholecystectomized patients, 2 tests were not evaluable, and the other was negative. The SGOT level increased from 24 to 73 U in the Debray-positive patients 4 hr after the test, but no such increase was seen in the cholecystectomized, Debray-negative patients. The incidence of pathological SGOT changes was 1/26 in the noncholecystectomized Debray-negative patients, 8/21 in the cholecystectomized Debray-negative patients, and 15/25 in the Debray-positive patients. The gamma-GT and serum and urine diastase tests furnished no diagnostically relevant information. The findings indicate that the combination of Debray's test with the SGOT test is more reliable in the diagnosis of dyskinesia of the hypertonic sphincter of Oddi than is Debray's test alone.

3364 TRANSDUODENAL DILATATION OF THE SPHINCTER AND ITS RISKS. (Ger.) Schmidt, H. D.; Brunner, H.; Wendling, P. (Chirurgische Universitatsklinik Mainz, D-65 Mainz, W. Germany). *Wien. Med. Wochenschr.* 127(24):743-744; 1977.

Experience with transduodenal dilatation (bougienage) of the ampulla of Vater in 795 cases is presented. Ten patients developed complications; four had perforation of the choledochus, two had stenosis of the ampulla of Vater, three had pancreatitis, and a small tumor of the ampulla was overlooked in another. There was no postoperative mortality. If difficult probing occurs, the ampulla should always be exposed by laparotomy. The findings indicate that transduodenal dilatation of the ampulla of Vater is a fairly low-risk intervention, if it is performed for the proper indications.

3365 COMPLICATIONS OF SPHINCTEROTOMY. (Eng.) Mercadier, M.; Clot, J. P.; Chigot, J. P.; Hermant, C. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, France, 8-9 June 1976.* (Basel: S. Karger): 196-200; 1977.

Complications of sphincterotomy in 109 cases are considered along with those in several series reported in the literature. The percentage of sphincterotomies in relation to gallstones was 10% and in relation to stones in the common duct was 40%; these figures are lower than those published by previous authors. The most serious postoperative complication was acute pancreatitis. It was responsible for one death (confirmed at autopsy) and possibly for another, giving a maximum mortality rate due to pancreatitis of 1.8%, which is very close to that reported in other series. However, acute pancreatitis represents a relatively rare complication of sphincterotomy and has also been seen after simple cholecystectomy or bilio-intestinal anastomosis. With respect to postoperative morbidity, the following were seen: two abdominal dehiscences, one leakage of bile, one duodenal fistula, and two subphrenic abscesses, none of which could be imputed to the operative procedure. It is concluded that the procedure is associated with neither greater morbidity nor mortality than other operations involving the main bile ducts. Sphincterotomy is an essential procedure, but it should not be carried out on a routine basis.

3366 BENIGN STRICTURES OF THE TERMINAL COMMON BILE DUCT: PATHOLOGICAL AND SURGICAL CONSIDERATIONS. (Eng.) Fernandez-Cruz, L.; Palacin, A.; Pera, C. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, France, 8-9 June 1976.* (Basel: S. Karger): 137-144; 1977.

In an effort to understand the pathological substratum of stenosis to gain greater precision of diagnostic terminology and to better assess the need for sphincterotomy, a histological study was conducted on specimens obtained by operative biopsy after sphincterotomy in 51 patients (44 women and 7 men) and the results compared with preoperative cholangiographic data. The following conditions were observed: 1) alterations of the glandular system (13 cases), 2) diffuse fibrosis (11 cases), 3) alterations of the glands with inflammatory com-

ponent (10 cases), 4) inflammatory infiltration (11 cases), and 5) pancreatic heterotopia with fibrosis (2 cases). Among the cases of biliary lithiasis studied, choledocholithiasis was present in 68% and lithiasis of the gallbladder in 31.8%. Benign stricture of the terminal common bile duct was diagnosed by preoperative cholangiogram but the lesion type is unidentifiable until after the sphincterotomy has been performed.

3367 THE GALLBLADDER AS BILIARY CONDUIT IN NONRESECTABLE EXTENSIVE ACALCULOUS EXTRAHEPATIC DUCTAL OBSTRUCTION. (Eng.) Feuchtwanger, M. M. (Dept. Surgery, Ben Gurion Univ., Beersheba, Israel). *Chir. Gastroenterol.* 11(2):243-247; 1977.

3368 BILE PERITONITIS AND BILIARY TUBERCULOSIS: A CASE REPORT. (Eng.) Heydenrych, J. J.; Du Toit, D. F. (Tygerberg Hosp., Parowvallei, Cape Town, South Africa). *S. Afr. Med. J.* 52(14):580-582; 1977.

3369 SILK SUTURES IN THE COMMON BILE DUCT. (Eng.) Rees, B. I.; Jacob, G. (Univ. Hosp. Wales, Cardiff, Wales). *Br. Med. J.* 2(6097):1265; 1977.

3370 EVALUATION OF CHOLESTATIC JAUNDICE BY COMPUTED TOMOGRAPHY. (Eng.) DiGiacomo, P. J., Jr.; Laborda, O. E.; Stein, G. N.; Sheer, G. W., III; Herrera, A. F. (Presbyterian-Univ. Pennsylvania Medical Center, Philadelphia, PA). *Surg. Gynecol. Obstet.* 145(4):570-572; 1977.

3371 CHOLELITHIASIS AND HORMONAL THERAPY. (Eng.) Weiss, G. N.; Weiss, E. B. (Dept. Surgery, Louisiana State Univ., New Orleans, LA). *Abdom. Surg.* 19(9):203-205; 1977.

3372 ADVANCED HYPERBILIRUBINEMIA SIMULATING OBSTRUCTIVE JAUNDICE AFTER CHOLEDOCHOLITHOTOMY: REPORT OF A CASE. (Eng.) Bergqvist, D.; Hallbook, T. (Karnsjukhuset, Skovde, Sweden). *Acta Chir. Scand.* 143(4):245-248; 1977.

3373 RESIDUAL BILIARY TRACT STONES: NONOPERATIVE TREATMENT OF 570 PATIENTS. (Eng.) Mazzariello, R. M. (Rivadavia Hosp., Buenos Aires, Argentina). *Surg. Annu.* 8:113-144; 1976.

3374 MANOMETRIC EVALUATION OF SURGICAL SPHNICTEROPLASTY OF THE ODDI [Abstract]. (Eng.) Guelrud, M.; Plaza, J.; Roa, E.; Zambrano, V.; Beker, S. (Escuela de Medicina, Universidad Central de Venezuela, Caracas, Venezuela). *Gastroenterology* 72(5, Part 2):1066; 1977.

3375 DUODENOSCOPIC MANOMETRY OF THE BILE DUCT AND SPHINCTER OF ODDI [Abstract]. (Eng.) Ribeiro, B. F.; Cotton, P. B.; Dilawari, J. B.; Roberts, M.; Laurence, B. (Middlesex Hosp., London, England). *Gut* 18(5):A407; 1977.

3376 ENDOSCOPIC SPHINCTEROTOMY OF THE PAPILLA OF VATER [Abstract]. (Eng.) Classen, M.; Wurbs, D.; Hagenmuller, F. (Allgemeines Krankenhaus Barmbek, Rubenkamp 148, D-2000 Hamburg 60, W. Germany). *Gut* 18(5):A399; 1977.

3377 ANOMALOUS POSITION OF THE GALL-BLADDER: WITHIN THE LESSER SAC THROUGH THE EPIPLOIC FORAMEN. (Eng.) Yamasaki, M.; Sato, T. (Niigata Univ. Sch. Medicine, Niigata, Japan). *Acta Med. Biol. (Niigata)* 24(1):37-45; 1976.

3378 EXTRAHEPATIC BILIARY ATRESIA: AETIOLOGICAL, CLINICAL AND MANAGEMENT CONSIDERATIONS [Abstract]. (Eng.) Mowat, A. P.; Psacharopoulos, L. (No affiliation given). *Acta Paediatr. Belg.* 29(2):134; 1976.

3379 TUMOROUS CONDITIONS OF THE GALLBLADDER. (Eng.) Melson, G. L.; Reiter, F.; Evens, R. G. (Washington Univ. Sch. Medicine, 510 S. Kingshighway, St. Louis, MO 63110). *Semin. Roentgenol.* 11(4):269-282; 1976.

3380 EARLY DIAGNOSIS OF CANCER OF THE PAPILLA OF VATER [Abstract]. (Eng.) Davies, R. S.; Ho, C. S.; Langer, B.; Phillips, J. M.; McHattie, J. D. (Toronto General Hosp., Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1044; 1977.

3381 CHRONIC CHOLECYSTITIS AND CHOLELITHIASIS. (Eng.) Palayew, M. J. (Jewish General Hosp., 3755 Cote St., Catherine Rd., Montreal, Canada). *Semin. Roentgenol.* 11(4):249-257; 1976.

3382 ORAL PHOSPHOLIPIDS AND PHOSPHOLIPID PRECURSORS FAIL TO ALTER BILIARY LIPIDS IN CHOLELITHIASIS [Abstract]. (Eng.) Holan, K. R.; Holzbach, R. T. (Cleveland Clinic Foundation, Cleveland, OH). *Gastroenterology* 72(5, Part 2):1070; 1977.

3383 CHEMICAL FACTORS INVOLVED IN CHOLESTEROL GALLSTONE FORMATION--POSSIBLE PREVENTION AND MEDICAL MANAGEMENT. (Eng.) Navarro, M. D.; Guevara, B. Q. (Univ. Santo Tomas Res. Center, Philippines). *Acta Manilana* 15(24):25-33; 1976.

3384 GALLSTONE COMPOSITION: CENTER VS PERIPHERY OF CHOLESTEROL OR PIGMENT GALLSTONES [Abstract]. (Eng.) Williamson, C. E. (Sch. Medicine, Univ. Pennsylvania, Philadelphia, PA). *Gastroenterology* 72(5, Part 2):1150; 1977.

3385 REDUCTION IN LITHOCHOLIC AND DESOXYCHOLIC ACID IN BILE AND FECES DURING CLINDAMYCIN [Abstract]. (Eng.) Knipp, J. E.; Aroesty, S.; Flood, M. S.; Faloon, W. W. (Highland Hosp., Rochester, NY). *Gastroenterology* 72(5, Part 2):1081; 1977.

3386 CHENIC ACID IN GALLSTONE PATIENTS: EFFECT OF LOW CHOLESTEROL AND OF HIGH PLANT STEROL DIETS [Abstract]. (Eng.) Maudgal, D. P.; Bird, R.; Enyobi, V. O.; Blackwood, W. S.; Northfield, T. C. (St. George's Hosp. Medical Sch., London, England). *Gut* 18(5):A419; 1977.

3387 MEDIUM CHAIN GLYCERIDES RAPIDLY DISSOLVE CHOLESTEROL GALLSTONES IN VITRO [Abstract]. (Eng.) Thistle, J. L.; Carlson, G. L.; Hofmann, A. F.; Babayan, V. K. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(5, Part 2):1141; 1977.

3388 PLANT STEROLS INCREASE EFFECTIVENESS OF CHENODEOXYCHOLIC ACID THERAPY IN LOWERING CHOLESTEROL SATURATION OF FASTING STABLE BILE IN PATIENTS WITH RADIOLUCENT GALLSTONES [Abstract]. (Eng.) Tangedahl, T. N.; Matseshe, J. W.; Thistle, J. L.; Hofmann, A. F. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(5, Part 2):1138; 1977.

3389 VERY LOW DOSE ORAL CHENODEOXYCHOLIC ACID (CDCA) WILL PRODUCE NON LITHOGENIC BILE AND DISSOLVE GALLSTONES [Abstract]. (Eng.) Danzinger, R. G. (Dept. Surgery, Univ. Manitoba, Winnipeg, Manitoba, Canada). *Gastroenterology* 72(5, Part 2):1042; 1977.

3390 CHIMPANZEES SULFATE LITHOCHOLATE: COMPARATIVE TOXICOLOGICAL STUDIES RELEVANT TO THE SAFETY OF CHENODEOXYCHOLIC ACID THERAPY FOR GALLSTONES [Abstract]. (Eng.) Hofmann, A. F.; Schwenk, M.; Greim, H.; Carter, J. A.; Carlson, G. L. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(5, Part 2):1070; 1977.

3391 FAILURE OF CHENODEOXYCHOLIC ACID (CDCA) TO REVERSE BILE SUPERSATURATION IN OBESE SUBJECTS ON WEIGHT MAINTENANCE [Abstract]. (Eng.) Mok, H. Y. I.; Crouse, J.; Grundy, S. M. (Dept. Medicine, Univ. California, San Diego, CA). *Gastroenterology* 72(5, Part 2):1104; 1977.

3392 NOVEL PHYSICAL-CHEMICAL PROPERTIES OF URSODEOXYCHOLIC ACID (UDCA) AND ITS CONJUGATES: RELEVANCE TO GALLSTONE DISSOLUTION IN MAN [Abstract]. (Eng.) Carey, M. C.; Mazer, N. A.; Benedek, G. B. (Peter Bent Brigham Hosp., Boston, MA). *Gastroenterology* 72(5, Part 2):1036; 1977.

3393 EXPANDED BILE ACID POOL AND REDUCED LITHOGENIC POTENTIAL OF BILE AFTER VAGOTOMY [Abstract]. (Eng.) Duane, W. C.; Stempel, J. M. (Veterans Admin. Hosp., Minneapolis, MN). *Gastroenterology* 72(5, Part 2):1051; 1977.

3394 HEPATIC CHOLESTEROL SYNTHESIS: A DETERMINANT OF CHOLESTEROL SECRETION IN GALLSTONE PATIENTS [Abstract]. (Eng.) Key, P. H.; Bonorris, G. G.; Coyne, M. J.; Taub, M.; Schoenfield, L. J. (Cedars-Sinai Medical Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1182; 1977.

3395 DL-284, A BILE-ACID AND CHOLESTEROL-SEQUESTERING RESIN, HAS A DUAL BENEFICIAL EFFECT ON BILIARY LIPID COMPOSITION [Abstract]. (Eng.) Soloway, R. D.; Balistreri, W. F. (Univ. Pennsylvania Sch. Medicine, Philadelphia, PA). *Gastroenterology* 72(5, Part 2):1182; 1977.

3396 CHOLANGIOGRAPHIC ABNORMALITIES IN PERICHOLANGITIS: A SPECTRUM OF BILE DUCT INVOLVEMENT [Abstract]. (Eng.) Blackstone, M. O.; Nemchausky, B. A. (Dept. Medicine, Univ. Chicago, Chicago, IL). *Gastroenterology* 72(5, Part 2):1030; 1977.

3397 PHENOBARBITAL THERAPY IN INTRAHEPATIC AND EXTRAHEPATIC CHOLESTASIS IN ADULTS: A RANDOMIZED TRIAL [Abstract]. (Eng.) Metreau, J. M.; Lecomptë, Y.; Arondel, J.; Dhumeaux, D. (Service d'Hepatogastroenterologie, Hopital Henri-Mondor, 94010 Creteil, France). *Digestion* 15(5):442-443; 1977.

3398 DIFFERENCES IN HEPATIC ORGANIC ANION CLEARANCES BETWEEN TWO GROUPS OF ASYMPTOMATIC PATIENTS WITH BENIGN RECURRENT CHOLESTASIS (BRC) [Abstract]. (Eng.) van Berge Henegouwen, G. P.; Ferguson, D. R.; Hofmann, A. F.; de Pagter, A. G. F.; Brandt, K. H. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(5, Part 2):1167; 1977.

3399 COMPARISON OF CT BODY SCANS AND ULTRASONOGRAMS IN THE SEARCH FOR BILIARY DUCTAL DILATION IN PATIENTS WITH JAUNDICE [Abstract]. (Eng.) Goldberg, H. I.; Korobkin, M.; Filly, R.; Moss, A. A. (Dept. Radiology, Univ. California, San Francisco, CA). *Gastroenterology* 72(5, Part 2): 1063; 1977.

3400 EVALUATION OF ERC AND PTC IN PATIENTS WITH SUSPECTED OBSTRUCTIVE JAUNDICE [Abstract]. (Eng.) McKnight, W. D.; Shah, S. M.; Jones, S. A.; Greenway, C. D.; Nagai, N.; White, W. D.; *et al.* (Univ. Arkansas for Medical Sciences, Little Rock, AR). *Gastroenterology* 72(5, Part 2):1100; 1977.

3401 COMPARISON OF HEPATIC SCINTISCANNING AND GREYSCALE ULTRASONOGRAPHY IN THE DIAGNO-

SIS OF CHOLESTATIC JAUNDICE [Abstract]. (Eng.) Farthing, M. J. G.; Wraight, E. P.; Tudor, J.; Hunter, J. O. (Addenbrooke's Hosp., Cambridge, England). *Gut* 18(5):A417-A418; 1977.

3402 AMPULLARY STENOSIS: CLINICAL PRESENTATION, DIAGNOSIS AND MANAGEMENT [Abstract]. (Eng.) Raskin, J. B.; Kaplan, S.; Kafka, E. (Univ. Miami Sch. Medicine, Miami, FL). *Gastroenterology* 72(5, Part 2):1116; 1977.

See also, 2642, 2648, 2788, 2803, 2815, 2938, 2957, 2958, 2959, 2969, 2975, 3015, 3116, 3142, 3155, 3161, 3221, 3254, 3276, 3425, 3426, 3434, 3464.

GENERAL

3403 GLUTEN-FREE DIET IN DERMATITIS HERPETIFORMIS: I. CLINICAL RESPONSE OF SKIN LESIONS IN 80 PATIENTS. (Eng.) Reunala, T.; Blomqvist, K.; Tarpila, S.; Halme, H.; Kangas, K. (Univ. Central Hosp., Snellmaninkatu 14, SK-00170 Helsinki 17, Finland). *Br. J. Dermatol.* 97(5):473-480; 1977.

The results of therapy with a gluten-free diet (GFD) for dermatitis herpetiformis in 81 patients were compared with those in 49 dermatitis herpetiformis patients on a normal diet. The 81 patients received a GFD for 6 to 36 months. At the end of treatment, the daily requirement of dapsone was significantly lower in patients treated with a GFD than in the 49 patients on a normal diet ($p<0.001$); the mean daily dose in the GFD group was 92 ± 53 mg before treatment and 37 ± 38 mg after treatment, while in the group on the normal diet, the mean daily dose remained practically unaltered and was 87 ± 44 mg at the end of the study. Ninety-three percent of the patients on a GFD were able to reduce the dose of dapsone, whereas only 16% of the patients on a normal diet were able to do this. Complete remissions occurred only in patients on a GFD. Twenty-eight percent of the patients on a GFD were able to stop dapsone completely and were continuously asymptomatic when they observed a strict diet. A response to a GFD was noted on the mean daily requirement of dapsone as soon as the treatment was initiated, although the length of time for an individual response varied. After 1 yr on a GFD, the patients needed an average about 40% and after 3 yr about 20% of the dose required to control skin symptoms at the beginning of the diet. The patients responded to a GFD irrespective of changes found in the jejunal mucosa and irrespective of the presence or absence of histocompatibility locus antigen-B8.

3404 DERMATITIS HERPETIFORMIS: A COMPARATIVE ASSESSMENT OF SKIN AND BOWEL ABNORMALITY. (Eng.) Cooney, T.; Doyle, C. T.; Buckley, D.; Whelton, M. J. (St. Finbarr's Hosp., Cork, Ireland). *J. Clin. Pathol.* 30(10):976-980; 1977.

To determine whether there is a correlation in severity between the lesions of dermatitis herpetiformis in the skin and in the small bowel mucosa, 18 patients with a clinical diagnosis of dermatitis herpetiformis who were being treated with dapsone and were on an unrestricted diet were studied. The diagnosis was confirmed by finding IgA deposits in the dermal papillae of unaffected skin. Dapsone was discontinued, and biopsy of affected skin was carried out when the typical rash reappeared. The biopsy findings were graded according to the severity of the histological changes. Small bowel tissue from each patient was examined and graded by stereo- and routine microscopy. Thirteen specimens were stereo-microscopically abnormal; all 18 showed villous atrophy, either partial or subtotal; and in 13 the interepithelial lymphocyte count was increased. No correlation was found between the histological severity of the skin and the small bowel lesions. The severity of the skin rash in dermatitis herpetiformis is apparently no guide to the degree of small bowel abnormality.

3405 THERAPEUTIC EXPERIENCE WITH IMODIUM® (LOPERAMIDE), A NEW ANTIDIARRHEAL AGENT. (Ger.) Geginat, G.; Palme, G.; Puls, G.; Seufert, O. (Institut fur Radiologie und Strahlenklinik, Krankenhaus Celler Strasse, 3300 Brunswick, W. Germany). *Therapiewoche* 27(47):8592, 8595-8597, 8600-8603; 1977.

Therapeutic trials with loperamide hydrochloride (Imodium), a new antidiarrheal drug acting directly on the intestinal wall, are described. Double-blind cross-over trials were performed in 10 patients with chronic diarrhea. The diarrhea was of undetermined genesis in five cases; chronic ulcerative colitis was diagnosed in three cases, irritable colon and proctitis in one, and diverticulitis in another. Reasec (diphenoxylate hydrochloride + atropine sulfate) was given as a reference drug. The duration of the treatment with the first drug was up to 35 days, after which the patients were switched to the other (unknown) drug upon recurrence of diarrhea. Both drugs were administered in doses of 10 mg/day. Imodium reduced the frequency of defecation and increased the consistency of the feces more effectively than did Reasec. At the end of the treatment, but before the code was broken, seven patients preferred Imodium to Reasec, two preferred the latter, and one was undecided. Side-effects were seen in five patients; there was only one patient who had side-effects exclusively under Imodium therapy. Forty-five patients with radiogenic diarrhea caused

by telecobalt irradiation (total focal dose 575-6,000 rads, average 3,454 rads) were treated with Imodium (average dose 4.51 mg/day, total dose 52.53 mg, average length of treatment 12 days). Normalization of the defecation frequency and of the consistency of the feces were achieved in 42 of the 45 patients after 6.4 days of treatment. The hematological and biochemical examinations (SGPT, SGOT, alkaline phosphatase, creatinine, urea nitrogen, erythrocyte count, WBC count and differential blood picture) showed no changes.

3406 LONG-TERM SURVEY OF THE TREATMENT OF DIARRHEA WITH LOPERAMIDE. (Eng.) Mainguet, P.; Fiasse, R.; Turine, J. B. (Avenue J. Delleur 20, B-1170 Brussels, Belgium). *Digestion* 16(1/2): 69-76; 1977.

Long-term efficacy and safety of loperamide and its possible morphine-like effect were studied in 42 outpatients with chronic diarrhea of varying etiology. Individually adapted doses (2-12 mg) were administered for 140-1,159 days. The daily number of bowel movements, the consistency of stools, and the number of capsules used were recorded. In 32 patients, some of the following indices were estimated: ESR, Hb (hemoglobin), RBC, Hc, WBC and its differential count, and serum iron. In 10 patients, the pupil diameters were measured after the subcutaneous injection of 1 ml of naloxone; this test was also performed in 10 subjects following the injection of an isotonic NaCl solution. No significant difference was observed in loperamide consumption between subjects treated for 6 months, 1 yr, and 2 yr. The mean daily stool frequency in all patients dropped from 6 to 2 ($p<0.0001$) during the first year of treatment. In 25 patients treated longer, it decreased from 5.75 to 2 during the first year ($p<0.0001$) and to 2.5 during the second year ($p<0.0001$). In 11 patients treated for more than 2 yr, the daily stool frequency decreased from 6 to 3 during the first year ($p=0.0005$), to 3 in the second year ($p=0.0005$), and to 2.5 in the third year ($p=0.0006$). In patients whose stools were liquid at the beginning of treatment, the stools became "loose" during the first year ($p<0.0001$). In the group treated longer than 2 yr, the stools were "formed" during the first year ($p=0.0006$) and "loose" during the second ($p=0.03$) and the third ($p=0.0005$) years. The treatment was unsuccesful in five patients with chronic diarrhea of unknown etiology. No adverse effects of loperamide were observed, and laboratory tests did not show any drug-related anomalies in blood composition. No significant difference in the pupil diameters was found between patients injected with naloxone or NaCl solution. The studies proved the efficacy and safety of loperamide in the treatment of chronic diarrhea, and no morphine-like effect was observed.

3407 PROSTAGLANDIN-INDUCED DIARRHOEA TREATED WITH LOPERAMIDE OR DIPHENOXYLATE: A DOUBLE-BLIND STUDY. (Eng.) Lange, A. P.; Secher, N. J.; Amery, W. (Odense Sygehus, Odense, Denmark). *Acta Med. Scand.* 202(6):449-454; 1977.

Loperamide was compared double-blind with diphenoxylate and a placebo in 59 women with diarrhea due to prostaglandin administration for mid-trimester abortion. Treatment was started with the intake of two capsules (2 mg loperamide/capsule or 2.5 mg diphenoxylate/capsule) 2 hr before the first i.m. injection of 15(S-)15 methyl prostaglandin $F_{2\alpha}$ (250 µg every 2 hr) and was then adapted individually, i.e., one capsule after each unformed stool, with a maximum of 10 per 24 hr. Both antidiarrheals were significantly more effective than the placebo in preventing diarrhea, and loperamide was found to be more active than diphenoxylate. The number of double-blind capsules taken per 1 ml of injected prostaglandin solution was significantly higher with the placebo than with loperamide ($p=0.05$), but the difference with diphenoxylate was not significant. The amount of drug in milligrams used per 2 ml prostaglandin was significantly higher with diphenoxylate than with loperamide ($p=0.008$). The mean amounts were 3.5 mg with diphenoxylate as compared with 2.3 mg with loperamide, suggesting that the latter is at least 1.5 times more active than the reference substance in this type of diarrhea. The course of abortion, blood pressure, and vital signs, or prostaglandin side-effects other than diarrhea were not affected by either antidiarrheal, nor could any adverse experience be specifically attributed to them.

3408 SURGICAL MANIFESTATIONS OF EOSINOPHILIC GASTROENTERITIS IN THE PEDIATRIC PATIENT. (Eng.) Hoefer, R. A.; Ziegler, M. M.; Koop, C. E.; Schnaufer, L. (Children's Hosp. Philadelphia, 34th and Civic Center Blvd., Philadelphia, PA 19104). *J. Pediatr. Surg.* 12(6):955-962; 1977.

Four cases of eosinophilic gastroenteritis in children are added to the 11 retrieved from a literature review. The inflammation in these cases and in those in the literature was characterized by mature eosinophils predominating a transmural process, which produced pain, obstruction, perforation, bleeding, or fistulae. All levels of the gastrointestinal tract were involved, but the stomach (25.9%) and small bowel (66.7%) lesions were most common. Eosinophilia occurred in 61% of children and allergy in 13%. X-rays demonstrated a diffuse or localized process. Operative intervention was necessary in some cases to exclude tumors or regional enteritis, and at times to extirpate complications of local disease, but conservative therapy was the treatment of choice for this exacerbating-remitting disease.

3409 NECROTIZING ENTEROCOLITIS: CONTROLLED STUDY OF 3 YEARS' EXPERIENCE IN A NEONATAL INTENSIVE CARE UNIT. (Eng.) Bunton, G. L.; Durbin, G. M.; McIntosh, N.; Shaw, D. G.; Taghizadeh, A.; Reynolds, E. O. R.; *et al.* (Univ. Coll. Hosp. and Medical Sch., London, England). *Arch. Dis. Child.* 52(10):772-777; 1977.

To obtain information about possible predisposing factors in necrotizing enterocolitis (NEC), clinical

data from 17 infants treated for NEC were compared with those in 51 controls. The incidence of NEC was 0.2% of live births at the University College Hospital during a 3-yr period and 2.7% of those referred from elsewhere. The mean birth weight of the affected infants was 1,832 g (range 878-3,850 g) and mean gestational age, 33 weeks (range 28-40 weeks). The illness was diagnosed at a mean age of 16 days (range 3-33 days). Fourteen infants survived. One infant developed NEC because of a volvulus, and another because of an apparently abnormal arterial supply to a segment of bowel. Birth asphyxia, the use of umbilical catheters, the length of time that these catheters were in place, and complications of catheterization were all significantly more frequent in the infants who developed NEC than in the controls. These findings support the view that hypoxia and ischemia of the gut wall are important in the pathogenesis of NEC.

3410 SKIN LESIONS IN ACQUIRED ZINC DEFICIENCY DUE TO PARENTERAL NUTRITION. (Eng.) van Vloten, W. A.; Bos, L. P. (Univ. Hosp., Leiden, Netherlands). *Dermatologica* 156(3):175-183; 1978.

Skin lesions seen in 10 patients who received parenteral nutrition during treatment of chronic enteropathy are described. All patients had a lowered serum zinc concentration (2 μM). The skin lesions were similar to those seen in acrodermatitis enteropathica, and occurred on the face (seborrhoic-like lesions), trunk, and groin (vesicular-pustular lesions). After supplementation with zinc sulfate, the skin lesions disappeared completely. A decrease in the serum alkaline phosphatase level can be regarded as a sign of an impending zinc deficiency. Parenteral nutrition should contain a sufficient amount of zinc.

3411 CELLULAR IMMUNITY IN ADULT MARASMUS. (Eng.) Bistrian, B. R.; Sherman, M.; Blackburn, G. L.; Marshall, R.; Shaw, C. (Cancer Res. Inst., 194 Pilgrim Rd., Boston, MA 02215). *Arch. Intern. Med.* 137(10):1408-1411; 1977.

Studies were carried out in 12 patients with marasmus to determine what deficits in immune function are found when the serum albumin level is maintained and what degree of adult marasmus is necessary to produce immunodeficiency. All patients had recent weight loss to less than 85% of standard weight/height ratio and a serum albumin level of at least 3 g/100 ml. Cellular immune function was assessed by delayed hypersensitivity skin testing to *Candida* and streptokinase-streptodornase; peripheral lymphocyte count; proportion of thymus- and bone marrow-derived lymphocytes; and whole blood and isolated lymphocyte transformation to phytohemagglutinin, pokeweed mitogen, concanavalin A, *Candida*, and streptokinase-streptodornase. Significant impairment of skin test reactivity while *in vitro* responsiveness remained intact was noted in the marasmic patients. No impairment was found in 12 individuals with recent weight loss who remained at a weight greater than the 85% weight/height ratio. In four marasmic individuals in whom weight loss was arrested by nutritional repletion, skin reactivity returned without substantial change in weight. In this type of marasmus, both depleted nutritional status and weight loss must be present for impairment of skin test responsiveness. These findings confirm relative sparing of more vital functions dependent on protein metabolism in adult marasmus compared to the kwashiorkor-like syndrome of hypoalbuminemic malnutrition seen in adults.

3412 H_2-HISTAMINE RECEPTOR BLOCKING AGENTS IN THE ZOLLINGER-ELLISON SYNDROME: EXPERIENCE IN SEVEN CASES AND IMPLICATIONS FOR LONG-TERM THERAPY. (Eng.) McCarthy, D. M.; Olinger, E. J.; May, R. J.; Long, B. W.; Gardner, J. D. (Natl. Inst. Arthritis, Metabolism and Digestive Diseases, Bldg. 10, Rm. 9D-17, Natl. Inst. Health, Bethesda, MD 20014). *Ann. Intern. Med.* 87(6):668-675; 1977.

The value of metiamide and cimetidine in the management of the Zollinger-Ellison syndrome was assessed in seven patients with this syndrome (serum gastrin >300 μg/ml, basal acid output >15 mEq/hr, ratio of basal acid output to maximal acid output >0.5). The i.v. or p.o. administration of the drugs lowered acid secretion by at least 70% in all cases. Subsequent treatment of six patients for 3 to 15 months (p.o. therapy) and one patient for 1 month (i.v. therapy) showed that the drugs abolished symptoms in all seven, abolished diarrhea in five, allowed ulcer healing in six, and were well tolerated without adverse effects in all seven. No patient failed to respond to the drug, although one died from tumor progression and two required total gastrectomy for complex reasons. The results indicate that patients with Zollinger-Ellison syndrome can be managed medically and, in light of current mortality trends, gain little from the extra risks attending total gastrectomy.

3413 USE OF CALCIUM AND SECRETIN IN THE DIAGNOSIS OF GASTRINOMA (ZOLLINGER-ELLISON SYNDROME). (Eng.) Deveney, C. W.; Deveney, K. S.; Jaffe, B. M.; Jones, R. S.; Way, L. W. (Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121). *Ann. Intern. Med.* 87(6):680-686; 1977.

To delineate the role of calcium and secretin tests in the diagnosis of gastrinoma, 65 patients with peptic ulcer disease were evaluated for gastrinoma (Zollinger-Ellison syndrome) by measuring changes in serum gastrin concentration after the i.v. administration of calcium or secretin, or both. The presence of gastrinoma was established in all 20 patients whose serum gastrin increased by 395 pg/ml or more after i.v. calcium (4 mg/kg/hr, 3 hr) and in all 18 patients whose serum gastrin concentration increased by 110 pg/ml or more after i.v. secretin (2 U/kg). The experience with these patients shows that stimulation by calcium or secretin may confirm the presence of gastrinoma in cases where the diagnosis would otherwise remain obscure. Although

a positive response to calcium or secretin is diagnostic for gastrinoma, a negative response does not exclude this diagnosis. Stimulation with secretin is preferred for screening for gastrinoma because it is quicker and more reliable than calcium.

3414 HISTOCOMPATIBILITY ANTIGENS (HL-A) IN COW'S MILK INTOLERANCE WITH MALABSORPTION SYNDROME IN CHILDREN [Abstract]. (Eng.) Kuitunen, P.; Tiilikainen, A.; Visakorpi, J. K. (No affiliation given). *Acta Paediatr. Belg.* 29(2):126; 1976.

3415 SOME CLINICAL DATA OF PROGNOSTIC IMPORTANCE IN PROTEIN-CALORIE MALNUTRITION (PCM). (Eng.) Laditan, A. A. O. (Inst. Child Health, Univ. Coll. Hosp., Ibadan, Nigeria). *Trop. Geogr. Med.* 28(3):216-219; 1976.

3416 EARLY SIGNS OF PROTEIN-CALORIE MALNUTRITION. (Eng.) DeMaeyer, E. M. (Nutrition Unit, World Health Organization, CH-1211 Geneva 27, Switzerland). *Bibl. Nutr. Dieta* (23):1-8; 1976.

3417 FURTHER POINTS ABOUT EARLY SIGNS OF PROTEIN-CALORIE MALNUTRITION. DISCUSSION CONTRIBUTION. (Eng.) Truswell, A. S. (Dept. Nutrition, Queen Elizabeth Coll., Univ. London, Campden Hill, London W8 7AH, England). *Bibl. Nutr. Dieta* (23):9-13; 1976.

3418 GASTRIC ACID, pH AND PEPSIN IN HEALTHY AND PROTEIN CALORIE MALNOURISHED CHILDREN. (Eng.) Shashidhar, S.; Shah, S. B.; Acharya, P. T. (Medical Coll., Baroda 390001, India). *Indian J. Pediatr.* 43(341):145-151; 1976.

3419 STUDY OF FERRUM METABOLISM IN MAN AFTER ORAL ADMINISTRATION OF ^{59}Fe. (Rus.) Gorobets, V. F.; Gabuniya, R. I. (Scientific Res. Inst. Medical Radiology, USSR Acad. Medical Sciences, Obninsk, USSR). *Med. Radiol. (Mosk.)* 22 (3):11-17; 1977.

3420 THE ROLE OF BREAST MILK IN THE IMMUNOLOGICAL PROTECTION OF THE NEONATAL GASTROINTESTINAL TRACT. (Rus.) Prozorovskaya, K. N.; Abrosimova, N. A.; Gorodnichenko, L. I.; Artemenko, L. V. (Moscow Scientific Res. Inst. Pediatrics and Pediatric Surgery, RSFSR Ministry of Public Health, Moscow, USSR). *Pediatriia* (5):31-34; 1977.

3421 THE GUT AS A POLYENDOCRINE SYSTEM. (Fre.) Casthelaz, M.; Griessen, M.; Felber, J. P. (Hopital Cantonal, CH-1211 Geneva, Switzerland). *Schweiz. Med. Wochenschr.* 107(2):33-37; 1977.

3422 STAGES AND LIMITS OF DIAGNOSIS IN GASTROINTESTINAL DISEASES. (Ger.) Strohmeyer, G.; Miller, B.; Wienbeck, M. (2. Medizinische Universitatsklinik und Poliklinik, Moorenstrasse 5, D-4000 Dusseldorf, W. Germany). *Internist (Berlin)* 18(3):137-148; 1977.

3423 THE EFFECT OF ANTACID THERAPY ON THE INTRAGASTRIC PROTEOLYSIS IN CHILDREN WITH GASTRODUODENAL DISEASES. (Rus.) Apostolov, B. G.; Mendzheritsky, I. M.; Samarina, G. Ya. (Dept. Pediatrics, Leningrad Inst. Sanitation and Hygiene, Leningrad, USSR). *Vopr. Okhr. Materin. Det.* 22(2):35-37; 1977.

3424 TOTAL EFFECTS OF GASTRIN (PENTAGASTRIN). (Rus.) Rafes, Yu. I.; Yagmur, S. S. (Dnepropetrovsk Inst. Gastroenterology, Dnepropetrovsk, USSR). *Ter. Arkh.* 49(2):37-38; 1977.

3425 EXPERIENCE WITH A NEW ENZYME DIMETHYLPOLYSILOXANE PREPARATION. (Ger.) Hudepohl, J. M. (Medizinische Klinik der Stadt. Kliniken, D-4500 Osnabruck, W. Germany). *Munch. Med. Wochenschr.* 119(26):905-906; 1977.

3426 PANPUR® IN THE TREATMENT OF DIGESTIVE DISTURBANCES OF VARIOUS ETIOLOGY. (Ger.) Liebhart, M. (Krankenhaus St. Josef des Caritasverbandes fur die Diozese Regensburg e. V., Landshuter Strasse 65, 8400 Regensburg, W. Germany). *Therapiewoche* 26(37):5734-5739, *passim*; 1976.

3427 EVALUATION OF THE SPASMOLYTIC ACTIVITY OF PINAVERIUM BROMIDE ON THE GASTROINTESTINAL MUSCULATURE AND THE SPHINCTER OF ODDI IN HUMANS. (Fre.) Paris, J.; Simon, V.; Itoua-Ngaporo, A. F. (Clinique des Maladies Digestives, C.H.U., Lille, France). *Rev. Fr. Gastroenterol.* (126):41-47; 1977.

3428 THERAPEUTIC USE OF SECRETIN. (Rus.) Rafes, Yu. I.; Melnichenko, L. Ya.; Bogdanovich, E. A.; Kornilova, S. N. (Dept. Hepatic Pancreatic Diseases, Dnepropetrovsk Scientific Res. Inst. Gastroenterology, Dnepropetrovsk, USSR). *Vrach. Delo.* (8):47-51; 1976.

3429 SIGNIFICANCE OF PARENTERAL HYPERALIMENTATION IN GASTROENTEROLOGICAL SURGERY. (Fre.) Capizzi, F. D.; Alonzo, A.; Abo-Rahmy, E. (Institut de la Premiere Clinique Chirurgicale et de Therapie Chirurgicale de l'Universite, Bologna, Italy). *Lyon Chir.* 73(4):306-308; 1977.

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See also, 2892, 2920, 2922, 2948, 2949, 2970, 2971, 2984, 2991, 2992, 3001, 3011, 3016, 3074, 3077, 3106, 3113, 3114, 3136, 3150, 3169, 3174, 3197, 3202, 3220, 3261, 3262, 3282, 3295, 3296, 3467.

GENERAL

Parasitology

3454 HEPATIC AMEBIASIS--ANALYSIS OF 56 CASES. II. LABORATORY AND CHEST X-RAY FINDINGS. (Eng.) Carneiro Chaves, F. J. Z.; Cruz, I.; Gomes, C.; Domingues, W.; Marques da Silva, E.; Tavarela Veloso, F. (Hosp. de S. Joao, Porto, Portugal). *Am. J. Gastroenterol.* 68(3):273-277; 1977.

Laboratory and chest x-ray findings are reviewed in 56 previously reported patients with hepatic amebiasis. Anemia and an elevated ESR, frequently without an elevated WBC count, were the most frequent hematologic findings; anemia occurred in 60.7% of patients, and an elevated ESR was found in 92.9%. Abnormalities of liver function tests were mild and nonspecific. The most frequent abnormality seen in the chest x-ray was an elevated right hemidiaphragm (74.5% of 55 patients x-rayed). The motility of the hemidiaphragm on fluoroscopy was reduced or abolished in 24 of 36 cases. These abnormalities may be useful in the diagnosis of amebiasis in endemic areas where more sophisticated facilities may not be available.

3455 A COMPARISON OF A SHORT COURSE OF SINGLE DAILY DOSAGE THERAPY OF TINIDAZOLE WITH METRONIDAZOLE IN INTESTINAL AMOEBIASIS. (Eng.) Misra, N. P.; Gupta, R. C. (Gandhi Medical Coll., Bhopal, India). *J. Int. Med. Res.* 5(6):434-437; 1977.

The therapeutic value of tinidazole was compared with that of metronidazole in 60 patients with symptomatic intestinal amebiasis who were treated for 3 days with a single dose of 2 g of either drug, resp., by random order. Tinidazole cured 27/30 patients and metronidazole cured 16/30 patients ($p<0.01$). Mild side-effects were reported by 8/30 patients in the tinidazole group as compared to mild to moderate side-effects reported by 16/30 patients in the metronidazole group ($p<0.05$). As the average patient has only a limited understanding and toleration of extended treatment courses, the advantages of a short course employing a single daily dose are obvious. With such a regimen, tinidazole is superior to metronidazole in the treatment of intestinal amebiasis.

3456 TREATMENT OF HEPATIC HYDATID DISEASE WITH MEBENDAZOLE: PRELIMINARY RESULTS IN FOUR CASES. (Eng.) Bekhti, A.; Schaaps, J. P.; Capron, M.; Dessaint, J. P.; Santoro, F.; Capron, A. (Baviere Hosp., 4020 Liege, Belgium). *Br. Med. J.* 2(6094):1047-1051; 1977.

Clinical echotomographic and serological investigations were carried out in four patients who received mebendazole for the treatment of hepatic hydatid disease. In three patients, hydatidosis had remained after surgery, and in the fourth it could not be treated surgically. Mebendazole was given p.o. in maximum doses of 400-600 mg three times

a day during courses lasting 21 to 30 days. Ultrasonic echotomography showed a complete regression of the intrahepatic cysts after 4 to 13 months in all four cases. In three patients, the course of treatment had to be repeated. Mebendazole also induced clinical improvement and a progressive lowering of the concentration of specific IgE of *Echinococcus granulosus*. During treatment, circulating blood levels of specific immune complexes of antigen 5 were increased. These observations indicate that mebendazole has a lethal effect on *E. granulosus* cysts in primary hydatid disease in man and that the efficacy of chemotherapy can be assessed with ultrasonography and by measuring changes in the concentration of specific IgE of *E. granulosus* and circulating immune complexes.

3457 GIARDIASIS IN DAY-CARE CENTERS: EVIDENCE OF PERSON-TO-PERSON TRANSMISSION. (Eng.) Black, R. E.; Dykes, A. C.; Sinclair, S. P.; Wells, J. G. (Center for Disease Control, Atlanta, GA 30333). *Pediatrics* 60(4):486-491; 1977.

An outbreak of diarrhea that occurred in children 1 to 3.5 yr old attending a day-care center during August and September 1975 was investigated. There were overlapping epidemics of shigellosis and giardiasis, with 54% of the children infected with *Giardia lamblia*. At two other centers, 29% and 38% of the children had *G. lamblia* infection, but none had *Shigella*. The prevalence of *G. lamblia* in the day-care children was significantly higher than the 2% prevalence in age-matched children not in day-care centers. The fact that the highest infection rate was found in mobile 1-yr-olds who were not toilet-trained suggests fecal-oral transmission of the parasite from child to child in the centers and from infected children to other family members.

3458 A COMMUNITYWIDE OUTBREAK OF GIARDIASIS WITH EVIDENCE OF TRANSMISSION BY A MUNICIPAL WATER SUPPLY. (Eng.) Shaw, P. K.; Brodsky, R. E.; Lyman, D. O.; Wood, B. T.; Hibler, C. P.; Healy, G. R.; *et al.* (Center for Disease Control, Atlanta, GA 30333). *Ann. Intern. Med.* 87(4):426-432; 1977.

An epidemiologic investigation was undertaken when 350 residents of Rome, New York, developed laboratory-confirmed cases of giardiasis between 1 November 1974 and 7 June 1975. A random household survey showed an overall attack rate for giardiasis (defined as a diarrheal illness of ≥5 days duration) of 10.6%. A significant association was discovered between having giardiasis and using city water and between having illness and drinking one or more glasses of water a day. The presence of human settlements in the Rome watershed area suggested that the water supply could have been contaminated by untreated human waste. The infectivity of municipal water was confirmed by producing giardiasis in specific pathogen-free dogs fed sediment samples of raw water obtained from an inlet of a city reservoir. A microscopic examination of the water sediments uncovered a *Giardia lamblia* cyst in one sample. This was the first time that a *G. lamblia* cyst has been found in municipal water in an epidemic and the first time that such water has been shown to infect laboratory animals.

3459 GIARDIASIS WITH TOTAL VILLOUS ATROPHY. (Eng.) Levinson, J. D.; Nastro, L. J. (55 Morris Ave., Springfield, NJ 07081). *Gastroenterology* 74(2, Part 1):271-275; 1978.

The case of a patient who developed symptomatic giardiasis with total villous atrophy after a tour of the Soviet Union is presented. The patient, a 57-yr-old woman, presented with a 2-week history of diarrhea and abdominal distention. Giardiasis was diagnosed by duodenal aspiration. A small intestinal biopsy revealed total villous atrophy in the absence of celiac sprue or a gastrointestinal immunodeficiency syndrome, a finding not previously described. The biopsy remains normal after a single course of metronidazole (250 mg, t.i.d., 10 days), despite subsequent exposure to gluten.

3460 ACUTE PERFORATING AMEBIC COLITIS. (Por.) Kerzner, A.; De Almeida Magalhaes, A.; Mattosinho Franca, L. C. (Hospital Sao Joaquim da Real e Benemerita Sociedade Portuguesa de Beneficencia de Sao Paulo, Sao Paulo, Brazil). *An. Paul. Med. Cir.* 104(1):57-69; 1977.

3461 HYDATID DISEASE: EPIDEMIOLOGY, DIAGNOSIS, AND THERAPY. (Ger.) Bahr, R.; Koslowski, L. (Chirurgische Universitatsklinik, Calwer Strasse 7, 7400 Tubingen, W. Germany). *Dtsch. Med. Wochenschr.* 102(30):1098-1101; 1977.

See also, 2665, 2917, 2919, 2937, 3017, 3254, 3257, 3432.

GENERAL

Regional Enteritis

3462 HISTOCHEMICAL COMPARISON OF THE EPITHELIAL MUCINS IN THE ILEUM IN CROHN'S DISEASE AND IN NORMAL CONTROLS. (Eng.) Culling, C. F. A.; Reid, P. E.; Dunn, W. L.; Clay, M. G. (Dept. Pathology, Univ. British Columbia, Vancouver V6T IW5, Canada). *J. Clin. Pathol.* 30(11):1063-1067; 1977.

Epithelial mucins were studied using routine and

special histochemical methods in specimens of small intestine from patients with Crohn's disease and from normal controls. The normal ileal goblet cells were found to secrete a predominantly nonsulfated sialomucin. The neuraminidase insensitivity of the sialic acids of the small intestine was not due to either O-acylation at C_4 or an ester substituent at C_1. This finding implies that the protection against enzyme attack afforded to the mucosa by the mucin coat in the small intestine utilizes a different mechanism from that in the colon. Although, in many respects, the small intestinal mucins in Crohn's disease patients and in normal controls were similar, there was an increase in side-chain O-acylated sialic acids in such mucins in Crohn's disease. This difference has not been described before, probably because it can be seen only after staining such sections by the periodate-thionin Schiff/saponification/PAS and periodate-borohydride technique/saponification/PAS.

3463 CANCER IN CROHN'S DISEASE AFTER DIVERSIONARY SURGERY: A REPORT OF SEVEN CARCINOMAS OCCURRING IN EXCLUDED BOWEL. (Eng.) Greenstein, A. J.; Sachar, D.; Pucillo, A.; Kreel, I.; Geller, S.; Janowitz, H. D.; *et al.* (Mount Sinai Sch. Medicine, Fifth Ave. and 100th St., New York, NY 10029). *Am. J. Surg.* 135(1):86-90; 1978.

The incidence of bowel cancer was studied in 132 patients who had undergone bypass surgery for Crohn's disease and who had been admitted to one hospital between 1960 and 1976. Seven patients developed cancer (4/63 with ileocolitis and 3/69 with ileitis). All seven cancers appeared in excluded loops, four in small bowel and three in colon. Six cancers occurred at sites of previous active inflammatory disease and one in a relatively normal "skipped" area of cecum. Four were associated with fistulas, two with enterovesical, one with enterocutaneous, and one with both. In only one case was a tumor mass palpable. All seven patients in this series underwent operation, and all showed metastatic spread to liver, lymph nodes, or adjacent organs. All patients died within 2 yr following the diagnostic laparotomy. The mean latent period between onset of disease and appearance of cancer was 27 yr and between bypass surgery and appearance of cancer 13 yr. Four of the seven cancers occurred relatively early, within 4 yr of the bypass procedure, but all seven cases had one feature in common--a long duration of Crohn's disease (ranging from 17 to 44 yr) prior to the development of cancer. The diagnosis of cancer in excluded bowel was difficult to make and impossible to confirm prior to laparotomy. Among the large bowel cancers, a preoperative diagnosis was established by sigmoidoscopy in only one case. Cancer in a bypassed loop should be suspected in any case of Crohn's disease of long duration when a late recrudescence of symptoms occurs, especially when the symptoms are associated with the new appearance of fistula or mass.

3464 GALLSTONE PREVALENCE AND BILIARY LIPID COMPOSITION IN INFLAMMATORY BOWEL DISEASE. (Eng.) Marks, J. W.; Conley, D. R.; Capretta, T. L.; Bonorris, G. G.; Chung, A.; Coyne, M. J.; *et al.* (Cedars-Sinai Medical Center, 8700 Beverly Blvd., Los Angeles, CA 90048). *Am. J. Dig. Dis.* 22(12):1097-1100; 1977.

Biliary cholesterol saturation was correlated with disease variables that might affect bile acid loss in nine ileitis patients with intestinal resection and eight ileitis patients without intestinal resection having a defined prevalence of gallstones. In addition, cholesterol saturation was determined in 7 ulcerative colitis patients, 18 gallstone patients, and 5 normal controls. The biliary cholesterol saturation index in ileitis patients both with and without resection (2.34 ± 0.14 and 2.07 ± 0.09, resp.) was similar to that in gallstone patients (2.10 ± 0.05), yet the prevalence of gallstones was only 12%. Cholesterol saturation did not correlate with ileal resection or the extent, duration, or activity of ileitis. Biliary cholesterol saturation was not different in ulcerative colitis patients from that in normal subjects. It is concluded that cholesterol saturation of bile alone does not account for the high prevalence of cholesterol gallstones that has been reported in ileitis patients.

3465 PATHOGENESIS OF DIVERTICULITIS COMPLICATING GRANULOMATOUS COLITIS. (Eng.) Meyers, M. A.; Alonso, D. R.; Morson, B. C.; Bartram, C. (New York Hosp., 525 E. 68 St., New York, NY 10021). *Gastroenterology* 74(1):24-31; 1978.

The pathological and radiological features of diverticulitis complicating granulomatous colitis were correlated with granulomatous colitis and associated diverticula in 21 patients who underwent resection during a 14-yr period. Sigmoid diverticulitis was pathologically confirmed in 10 patients. The radiological signs of peridiverticulitis complicating granulomatous colitis usually showed clear evidence of the underlying pathological changes. They included localized diverticular perforation, sometimes with multiple communications via a paracolonic sinus tract, mass pressure from the paracolic abscess, and occasionally some degree of communication with deep fissuring ulcers of Crohn's disease. Because diverticula breach the colonic wall, histological analysis confirms that their involvement by the transmural process of granulomatous colitis predisposes to peridiverticulitis and/or abscess formation.

3466 APHTHOID ULCERS IN CROHN'S COLITIS. (Eng.) Simpkins, K. C. (General Infirmary, Leeds, England). *Clin. Radiol.* 28(6):601-608; 1977.

One hundred and nine double-contrast barium enema examinations were carried out in 91 adults with Crohn's colitis, and the radiographs were examined for the presence of aphthoid ulcers. These small discrete ulcers were found in 40 patients and in 48 of the 109 examinations. Seen *en face*, each ulcer appeared as a central fleck of barium surrounded by a translucent halo set amid a patch of normal

mucosa. Their detection gave a more accurate assessment of the extent of disease. The radiographic demonstration of the evolution of ulceration is illustrated; it closely reflected what was seen on macroscopic examination of excised specimens and explains the characteristic patchiness and discontinuity of disease.

3467 HOME PARENTERAL NUTRITION AS PRIMARY THERAPY IN PATIENTS WITH EXTENSIVE CROHN'S DISEASE OF THE SMALL BOWEL AND MALNUTRITION. (Eng.) Fleming, C. R.; McGill, D. G.; Berkner, S. (Mayo Clinic, 200 First St. SW, Rochester, MN 55901). *Gastroenterology* 73(5):1077-1081; 1977.

Experience with seven patients with extensive Crohn's disease who had received nightly supplementary home parenteral nutrition (HPN) for a total of 120 patient months is presented. Indications for HPN were short bowel in five patients, growth failure in one, and gastric outlet obstruction in one. Before HPN, body weight averaged 72% of ideal body weight in five patients; one adolescent was less than the third percentile in weight. Anthropometry in six patients confirmed the decrease in fat and lean body mass in all. All patients were anemic, and serum albumin was low in six of seven (1.8-3.0 g/dl). During HPN, the average weight gain was 11 kg in the six patients treated for 6 months or longer. Hemoglobin increased an average of 1.5 g/dl and serum albumin increased an average of 1.0 g/dl. There was 50% fewer hospitalizations after HPN was begun compared with similar time periods before HPN. HPN did not prevent or reverse complications of Crohn's disease other than malnutrition. Major complications were displacement of the catheter on two occasions in one patient and metabolic acidosis in two patients. Sepsis did not occur. HPN is justified in selected patients with extensive Crohn's disease and malnutrition in that patients gain weight, nutritional parameters improve, and patients' activities increase as the number of hospitalizations decrease.

3468 CROHN'S DISEASE: CLINICAL AND THERAPEUTIC EXPERIENCE. (Spa.) Serrano Sanchez, P. A.; Martinez-Pineiro Carames, M.; Perez-Bedmar Pelaez, J. A.; Miras Estacio, M. (Gran Hospital del Estado, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(4):391-408; 1977.

3469 CROHN'S DISEASE IN THE NORTHERN DEPARTMENTS OF FRANCE. (Fre.) Paris, J.; Paris, J. C.; Claerbout, J. F. (Clinique des Maladies de L'Appareil digestif, C.H.U., 59000 Lille, France). *Bull. Acad. Natl. Med. (Paris)* 161(3):194-196; 1977.

See also, 2950, 3138, 3159, 3189, 3211, 3411.

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

ABADI, P.
3136*
ABO-RAHMY, E.
3429
ABRAHAMS, J.
3341
ABRAHAMSSON, H.
2708
ABRAHAO, L.J.
3197
ABRCSIMOVA, N.A.
3420
ACCATINO, L.
2858
ACHARYA, P.T.
3418
ADIBI, S.A.
2911
ADRIAN, T.E.
3215
AGUIAR, J.M.
2855
AHLBERG, J.
2784*
AILHAUD, G.
2875*
AIYATHURAI, J.E.J.
3323
AIZAWA, I.
2674*
AKIYAMA, T.
3296
ALAMI, S.Y.
3141*
ALBERT, H.
3445
ALBONE, E.S.
2889
ALDINI, R.
2949*
ALEXANDER-WILLIAMS, J.
3006, 3132
ALEXIU, O.
3130
ALLAN, B.M.
3212*
ALLAN, F.
2951*
ALLAN, P.N.
2792*, 3003
ALLEN, R.H.
2724*
ALLEN, W.E., III
3016
ALLGOWER, M.
3033
ALONSO, D.R.
3465*
ALONZO, A.
3429
ALPERS, D.H.
2634*, 2724*, 2877*, 3144*, 3157
AMBERG, J.
2648
AMBROSIONI, G.
3451
AMERY, W.
3407*
AMMON, H.V.
2656*, 2657*
ANDERSON, J.C.
2958*
ANDO, K.
3055*
ANDRASSY, R.J.
3073
ANGELICO, M.
2961*
ANGELIN, B.
2784*, 3258*
ANKUDINOV, F.S.
3244
ANSCHELWITSCH, J.
2725*
ANSFIELD, F.
3054*
ANTEZANA, C.
2816
ANTHONY, L.E.
2836
ANTHONY, P.P.
3254*
ANURAS, S.
2677*
APOSTOLOV, B.G.
3423
APPELMAN, H.D.
2813
ARAKI, H.
2686, 2687
ARCHAMBAULT, A.
3101*
ARHAN, P.
2672
ARKHIPOVA, G.F.
3267
ARNAUD-BATTANDIER, F.
2928
ARNESJO, B.
2950*
ARNOLD, W.
3318
ARDESTY, S.
3385
ARON, F.
2971
ARONDEL, J.
3397
ARONSEN, K.F.
2778*
ARROYO, V.
3342
ARSAC, M.
2693
ARTEMENKO, L.V.
3420
ARVANITAKIS, C.
3169*
ASKENASE, P.W.
2903*
ASKERKHANOV, R.F.
3283
ASLANOVA, N.R.
3199
ASSAD, R.T.
3133
ASSADOURIAN, R.
3345
ASTRUP, L.
3206*
ATHANASOULIS, C.A.
3227
ATTILI, A.F.
2961*
AUNE, S.
3219
AUST, J.B.
3047*
AUZERIE, J.
3174
AVERY, G.S.
3118
AVGERINOS, G.C.
2823
AYERS, A.B.
3139*
AYRE-SMITH, G.
2959*
AZULAY, R.D.
3197
BABA, A.
2874*
BABA, S.
3010
BABANDO, G.
3095*
BABAYAN, V.K.
3387
BABRIS, I.V.
3240
BACCINO, F.M.
2806
BACK, P.
3359*
BADER, R.
2667
BADOWSKI, A.
3152
BAGDANOVICH, N.E.
3439
BAGGENSTOSS, A.H.
3347
BAGLIN, M.C.
2971
BAHR, R.
3461
BAKER, M.
3075
BALABAUD, C.P.
2813
BALAS, D.
2735
BALAS, V.
2751*
BALASUBRAMANIAM, S.
2789*
BALIKIAN, J.B.
3141*
BALISTRERI, W.F.
3395
BALLANTINE, T.V.
3096*
BALSAN, S.
2866*

BANFFER, J.R.J.
3307*
BANK, S.
3123, 3125
BARA, J.
2929
BARAONA, E.
2780*
BARBARA, L.
3005, 3127, 3218
BARBEZAT, G.O.
3123, 3125
BARC, R.
3226
BARKER, L.F.
2856
BARRON, L.
3213*
BARROS D'SA, A.A.B.
2863*
BARROWS, G.H.
3001
BARTLETT, J.G.
2904*
BARTRAM, C.
3465*
BARTRAM, C.I.
3210
BARZILAI, D.
3300*
BASBOUS, D.
3275
BASSO, N.
3077
BASTIE, M.J.
2735
BATISTIC, B.
2646
BATTIN, J.
3174
BATTISTI, C.
3451
BAUCET, P.
3436
BAUER, F.L.R.
2864*
BAUER, R.F.
2706
BAUM, B.J.
2713
BEAUBERNARD, C.
2945, 2946
BEAZLEY, W.
3116
BECHRAOUI, T.
3441
BECK, B.
3038
BECK, I.T.
2886
BECKER, H.
2934
BEHAR, J.
3023*
BEKER, S.
3374
BEKHTI, A.
3456*
BELCKUROV, J.N.
3265
BEN BOUALI, A.
3436
BENEDEK, G.B.
3392
BENEDETTI, A.
2946
BENFATTO, G.
3444
BENHAMOU, C.
3177
BENNETT, A.
2629*
BERARD, A.
2748
BERARDI, R.S.
3059
BERDOV, B.A.
2974
BERG, T.
2801*
BERGEGARDH, S.
2739
BERGQVIST, D.
3372
BERK, J.E.
3011
BERK, R.
3014
BERK, R.N.
3188*
BERKNER, S.
3467*
BERNARD, C.
3115
BERNARD, J.M.
3277
BERNSTEIN, L.H.
3137*
BERRIS, B.
3320
BERTACCINI, G.
2690
BESTERMAN, H.S.
3215
BETRIU, A.
3342
BETTONI, C.
2965
BEYER, L.V.
3439
BEYREISS, K.
3178
BHATNAGAR, O.P.
2726*
BIASIO, A.
2965
BIEBL, W.
3106
BIEGER, W.
2768
BIEMPICA, L.
2642
BIEN, E.
2782*
BINDER, H.J.
2903*
BINDER, V.
3206*
BIRCH, G.G.
2901*
BIRCHER, J.
2802
BIRD, J.L.
2713
BIRD, R.
3386
BIRKETT, J.P.
3101*
BIRYUKOV, V.I.
3245
BISHOP, A.C.
2643
BISMUTH, H.
2945, 2946
BISTRIAN, B.R.
3411*
BITTER-SUERMANN, H.
2947
BJORKHEM, I.
2784*
BJORNEKLETT, A.
3168*
BLACK, R.B.
2723*
BLACK, R.E.
3457*
BLACKBURN, G.L.
3411*
BLACKLOW, N.R.
2822
BLACKSTONE, M.O.
3396
BLACKWOOD, W.S.
3386
BLAIR, E.L.
2740
BLANES, A.
2631*
BLANKESPOOR, H.D.
2919
BLASI, A.
3066
BLAZEK, Z.
3161
BLEI, A.
3340
BLENDERMANN, E.M.
2661*
BLITZER, B.L.
2854
BLOCH, K.J.
2883
BLOCH, R.
3161
BLOM, H.
2640*
BLOMQVIST, K.
3403*
BLOOM, S.R.
2643, 2885, 3215
BLOTMAN, M.J.
3431
BLUM, A.L.
2737

BOCQUET, L.
3177
BOEDEKER, E.C.
2924
BOESBY, S.
2700, 2705, 2995
BOGDANOVICH, C.A.
3428
BOGOMOLOVA, T.N.
3236
BOHLE, H.
3288
BOHLEN, H.G.
2897*
BOHMING, H.J.
3263*
BOISELLE, J.C.
2747
BOISSEL, P.
3274
BOLONDI, L.
3250
BOLT, R.J.
2820
BOND, H.E.
3313
BONDONNY, J.M.
3441
BONETTI, C.
3218
BONFILS, S.
2694
BONINO, F.
3308
BONNET-EYMARD, J.
3238
BONORRIS, G.G.
2790*, 2871*, 3394, 3464*
BONTING, S.L.
2761
BOONE, W.T.
2903*
BOOYENS, J.
3099*
BORGHI, E.
3005
BORGSTROM, B.
2765
BOS, L.P.
3410*
BOSCH, J.
3342
BOSE, A.A.K.
3060
BOSSENMAIER, I.
3260*
BOUCHIER, I.A.D.
2960*
BOUGHTON, C.R.
3311
BOULOS, P.B.
3007
BOURASSA, D.
2777
BOURREILLE, J.
3253*
BOVANI, I.
3067
BOWEN, W.H.
2713
BOWERS, J.
3121
BOYER, J.
3436
BOYER, J.L.
3349
BOYLE, J.M.
3053*
BRADY, P.G.
3042*
BRAGANZA, J.M.
3214
BRANCH, M.J.
2891
BRAND, G.
3445
BRANDT, K.H.
3398
BRANDT, L.J.
3137*
BREUER, R.I.
3158
BROCK, D.J.H.
3213*
BRODRICK, J.W.
2774
BRODSKY, R.E.
3458*
BROGDEN, R.N.
3118
BRONSTEIN, G.
2969
BROOKS, F.P.
2680*, 2706
BROOMAN, P.
3181*
BROWN, E.R.
2819
BROWN, F.
3038
BROWN, J.
2731
BROWN, P.W.
3182*
BRUCH, H.P.
2704
BRUEL, J.M.
2986
BRUNINGS, E.A.
3307*
BRUNNER, H.
2767, 3364*
BRYER, J.V.
3099*
BRYNGER, H.
2947
BUCHAN, A.M.J.
2643, 2885
BUCHANAN, K.D.
2771, 2863*, 2884
BUCKLEY, D.
3404*
BUFFA, R.
2637*
BUINOV, B.B.
2988
BUJAN, J.
2631*
BULGAKOV, G.A.
3155
BULL, J.
3105*
BULLEN, A.W.
3220
BULLEN, C.L.
2894*
BULLOCK, J.A.
2852
BUNN, P.
3064
BUNTON, G.L.
3409*
BURBIGE, E.J.
3186*
BURELLE, H.
2980
BURKES, E.J., JR.
2716
BURNEY, D.P.
2865*
BURNHAM, S.J.
2865*
BURTIN, P.
2929
BURTON, R.M.
3001
BUSING, M.
2934
BUTLER, J.
2854
BUTLER, M.L.
2922
BYRA, W.M.
2872*
CACCIARI, C.
3067
CADER, J.
2983
CAIROLI, G.
3451
CALDARA, R.
3103*
CALDERON, P.
2766
CALETTI, G.C.
3250
CALLARD, P.
3292
CALLENDER, S.T.
3105*
CALVERT, H.
2771
CAMPEL, R.
2842
CAPELLA, C.
2637*
CAPIZZI, F.D.
3429
CAPOCACCIA, L.
2961*
CAPRETTA, T.L.
3464*
CAPRON, A.
3456*

CAPRON, M.
3456*
CARBALLIDO, S.M.
2631*
CARBONI, M.
3360*
CARDINAL, R.
3260*
CAREY, M.C.
3392
CARL, W.R.
2757, 2776
CARLSON, G.L.
2803, 2848, 3122, 3387, 3390
CARMAN, R.
2804
CARNEIRO CHAVES, F.J.Z.
3454*
CARELI, J.
2691
CARPENTIER, Y.
2746
CARR, D.H.
2680*
CARRIGG, J.W.
3061
CARRILHO, F.
3342
CARTER, J.A.
2963*, 2964*, 3390
CARTER, R.F.
2888
CARTRY, E.
3431
CARTWRIGHT, T.
3330
CASADIO, R.
3005
CASINI, A.
2846
CASSADIO, R.
3127
CASTELL, D.O.
3031, 3038
CASTELLI, M.
3043*
CASTHELAZ, M.
3421
CASTRO, G.A.
2917
CATALANO, F.
3066
CERSONSKY, J.
2850
CESTERO, R.
3112
CHADWICK, G.
3331
CHALMERS, T.M.
3351
CHANDLER, D.E.
2749*
CHANDLER, J.G.
3143*
CHANTADA, C.A.
3120
CHAOUAT, Y.
3177
CHAPMAN, R.G.
3083
CHASOVSKIKH, G.G.
3267
CHATTOPADHYAY, D.K.
3027
CHAVVIALLE, J.A.P.
2748, 3115
CHELI, R.
3069, 3070
CHEN, K.H.
2855
CHEN, L.J.
2820
CHENG, J.T.
2686, 2687
CHENG, K.K.
2942
CHEUNG, L.Y.
2721*
CHHUTTANI, P.N.
2869*
CHIGOT, J.P.
3365*
CHIPRUT, R.C.
2760
CHIVARINI, M.
2690
CHODOSH, P.L.
3028
CHRISTOPHE, J.
2766
CHUNG, A.
2790*, 2871*, 3464*
CHUR, P.K.
2861
CIANCI, S.
3444
CICLITIRA, P.J.
3084
CIESZKOWSKI, M.
2742
CIMA, C.E.
3437
CIPOLLE, R.J.
3124
CISNEROS, R.L.
2904*
CIVALERO, L.A.
2699
CIZKOVA, J.
2751*
CLAERBOUT, J.F.
3469
CLARK, L.
2834
CLARKE, D.N.
3186*
CLARKE, R.M.
2898*
CLASSEN, M.
2695, 3358*, 3376
CLAY, M.G.
3462*
CLEMENT, J.P.
2980
CLENDINNEN, B.G.
3132
CLIFFORD, R.E.
3309
CLOT, J.P.
3365*
CLOT, M.
2979
CLOUSE, M.E.
3255*
COCCO, A.E.
3117
CODD, J.E.
3180*
COFFIN, J.C.
3352*
COGHILL, N.F.
3309
COHEN, B.I.
2791*
COHEN, J.R.
3040
COHEN, M.I.
2659*, 3064
COHEN, S.B.
3186*
COLALILO, A.
2793*
COLAPINTO, R.M.
3343
COLIN-JONES, D.G.
3083
COLIN, R.
3253*
COMPORTI, M.
2846
COMPSTON, J.E.
3138*, 3139*, 3350
CONDON, S.C.
3144*
CONLEY, D.R.
2871*, 3464*
CONLON, J.M.
2884
CONN, H.O.
3340
CONNOR, J.A.
2675*
CONNOR, S.L.
2908*
CONNOR, W.E.
2908*
CONTRERAS, A.
2816, 2858
CONTRI, D.
2965
COOK, G.C.
2660*, 2665*
COOK, M.A.
2683*
COOKE, A.R.
2677*

COOKSLEY, W.G.E.
2807, 2852
COONEY, T.
3404*
COOPERBERG, P.
2959*
COPELAND, E.M.
2932
CORBUSIER, C.
2815, 2818
CORINALDESI, R.
3005, 3127
CORLIN, R.
3145*
CORNELLI, U.
3127
CORRING, T.
2770
CORUZZI, G.
2690
COSTA, P.L.
3250
COTTON, P.B.
3008, 3009, 3375
COUR, J.C.
2969
COVE, H.
2790*
COWEN, A.E.
2963*, 2964*
COYNE, M.J.
2790*, 2871*, 3394, 3464*
CREAMER, B.
3138*, 3139*
CREMER, H.
2940
CREMER, M.
3233, 3234
CREUTZFELDT, W.
2753
CRIVELLI, O.
3095*
CROCELLA, A.
2967
CROFT, D.N.
3051*
CROS, R.C.
3345
CROSSMAN, M.I.
2736
CROUSE, J.
3391
CRUZ, I.
3454*
CSANYI, K.
2632*
CSENDES, A.
3446
CSUZ, L.
3284
CUESTA, G.
3019*
CULANK, L.S.
2999
CULLENS, H.
3315, 3321
CULLING, C.F.A.
2952*, 3462*
CUMMINGS, J.H.
2891
CURTIS, A.M.
3016
D'ANTONA, A.
3090
DALY, M.J.
2733
DAM, A.
2918
DAMJANOV, I.
2799*
DANDL, M.
3332*
DANIEL, E.E.
3146*, 3147*
DANZINGER, R.G.
3389
DARLE, N.
3225
DARNIS, F.
3344
DAUM, F.
2659*
DAVID, J.S.K.
2847
DAVID, S.
3130
DAVIE, M.
3351
DAVIES, E.R.
3044*
DAVIES, R.S.
3163, 3380
DAVIS, M.
3302*
DAVIS, R.A.
2797*, 2825, 2826
DAY, S.E.
2872*
DE ALMEIDA MAGALHAES, A.
3460
DE BERNARDINIS, G.
3360*
DE GRAEF, J.
2746
DE LA FUENTE, A.
3019*
DE PAGTER, A.G.F.
3398
DE PONT, J.J.H.H.M.
2761
DE REUCK, M.
3065
DE SCHEPPER, A.
3447
DE TOEUF, J.
3233, 3234
DEBAS, H.T.
2679*
DEBELLE, R.C.
2822
DEBOISBLANC, R.
3080
DEERING, T.B.
3122
DEFFONTAINE, O.
3277
DEHORATIUS, R.J.
3211
DEKKER, W.
2991
DEL MAZO, J.
2915
DELMONT, J.
2875*
DELTENRE, M.
3233, 3234
DELUCA, H.F.
2878*
DEMAEYER, E.M.
3416
DEMEESTER, T.R.
3034
DEMLING, L.
2914, 3051*, 3448
DENYER, M.E.
3008
DEORIO, A.J.
2893*
DESCHRYVER, K.
3334
DESCOS, F.
3115
DESGREZ, A.
3337*
DESHPANDE, Y.G.
2817
DESMET, V.J.
3316
DESSAINT, J.P.
3456*
DESVIGNE, C.
2738
DEVENEY, C.W.
3413*
DEVENEY, K.S.
3413*
DEVIN, R.
2980
DEWILDE, T.
3450
DHAR, G.J.
2662*
DHUMEAUX, D.
3397
DI COSTANZO, J.
3345
DI MACCO, G.
3249
DIANA, S.
3308
DICK, A.P.
3084
DICKSON, E.R.
2803, 3347
DIERICH, M.P.
2935
DIETZE, F.
3246
DIGAUD, A.
2666
DIGIACOMO, P.J., JR.
3370
DILAWARI, J.B.
3375

DIMAGNO, E.P.
2756, 3228*
DINDA, P.K.
2886
DOBRONTE, Z.
3363*
DODDS, W.J.
2993
DOERTENBACH, J.
2934
DOMINGUES, W.
3454*
DOMINIS, M.
2799*
DOMSCHKE, S.
2914, 3051*
DOMSCHKE, W.
2914, 3051*
DONALDSON, J.D.
3110
DONATI, A.
3196
DONDELINGER, R.
2986
DONECKER, R.
2805
DONOVAN, I.A.
3132
DOOS, W.
2840
DORDFEEV, G.I.
2968
DOUGLAS, A.P.
2809
DOYLE, C.T.
3404*
DOYLE, J.S.
3025
DOZOIS, R.R.
2756, 2873*
DREESMAN, G.R.
3306*
DROUIN, P.
3274
DU TOIT, D.F.
3368
DUANE, W.C.
3393
DUBITSKY, A.E.
3268
DUBS, R.
3149*
DUDCHENKO, V.A.
3205
DUDRICK, S.J.
2932
DUENES, J.
2848
DUFFAUD-THIERMAN, D.
3292
DUNN, W.L.
2952*, 3462*
DUPUIS, Y.
2666
DURANCEAU, A.
3035
DURBIN, G.M.
3409*
DURRINGTON, P.
2787*
DUTHIE, H.L.
3129
DUTLER, H.
2781*
DUVAL, F.
2973
DYCK, W.P.
2760
DYKES, A.C.
3457*
DYKES, P.W.
3003
DZHAUBAEV, M.O.
3093
DZOGA-LITWINOWICZ, M.
3135
EASTWOOD, G.
3038
EASTWOOD, G.L.
2910, 3133
EASTWOOD, M.A.
2880
EATON, H.L.
3193
EBERMANN, W.
3049*
ECKENSBERGER, D.
3106
ECKNAUER, R.
2898*
EDDLESTON, A.L.W.F.
3315, 3321
EDDS, G.T.
2919
EDLINGER, E.
2970
EINARSSON, K.
2784*, 3258*
EISEMAN, B.
2957*
EISMAN, J.A.
2878*
EL-HARITH, E.A.
2901*
EL SHEIKH, N.
3315, 3321
ELDER, M.A.
3179*
ELDER, J.B.
3108, 3128
ELIAKIM, M.
3312
ELLEN, W.A.
2743
ELLIS, H.
3104*
ELLIS, W.R.
2861
ENAT, R.
3300*
ENGEL, C.
3445
ENGELHOLM, L.
3233, 3234
ENGLERT, E., JR.
3079
ENGLISH, P.
3436
ENYOBI, V.O.
3386
ERAKLIS, A.
2819
EROKHIN, P.G.
2975
ESTELLER, A.
2798*
ETZEL, J.C.
3274
EULE, J., JR.
2957*
EVANS, W.H.
2645
EVENS, R.G.
3379
FABBRI, R.
3005, 3127
FABER, R.G.
3004
FABRE, C.
3275
FACCHINI, A.
3329*
FACER, P.
2885
FADEEV, N.P.
2968
FAGEN, N.D.
3319
FAGGIONI, L.G.
3443
FAGUNDES NETO, U.
2849
FALCHUK, Z.M.
2997
FALKENSTEIN, D.B.
2990
FALOON, W.W.
3385
FAMULARI, C.
3430
FARLEY, A.
3101*
FARRELL, G.C.
2807
FARROW, L.J.
3309
FARTHING, M.J.G.
3084, 3401
FASTH, S.
2902*
FAURES, B.
3177
FAUSA, O.
3168*
FAWCETT, R.A.
3214
FEDOROWSKI, T.
2793*
FEHER, E.
2632*

FEIGL, W.
3440
FEINMAN, L.
3333
FEINMAN, S.V.
3320
FEKETY, R.
2905*
FELBER, J.P.
3421
FELDMAN, E.J.
2931
FELDMAN, L.
2842
FELDMAN, M.
3100*
FELDMANN, G.
3278
FELIX, M.
2980
FERENCI, P.
3440
FERGUSON, A.
2951*
FERGUSON, D.R.
3398
FERLATTE, M.I.
2927
FERNANDEZ-CRUZ, L.
3366*
FERNANDEZ, M.S.
2858
FERRALI, M.
2846
FERRARI, A.
3095*
FERRARI, C.
3103*
FERRIER, J.P.
3292
FESTI, D.
2949*
FEUCHTWANGER, M.M.
3367
FEURLE, G.E.
2636*, 2882
FEYCY, P.
2672
FIASSE, R.
3406*
FIELDING, L.P.
3134
FILLY, R.
3399
FINBERG, L.
2659*
FINDLAY, J.
3335
FINEGOLD, S.M.
3179*
FINI, A.
3067
FINUCANE, J.
3025
FINZI, M.
3247
FISCHER, H.
2753
FISCHER, J.E.
2831
FISCHER, K.P.
3124
FISCHER, R.S.
3021*
FISHER, J.A.
2737
FISHER, J.H.
3075
FISHER, R.S.
3024*
FITZGERALD, J.F.
3096*
FLEMING, C.R.
3347, 3467*
FLETCHER, J.
3038
FLOCH, M.H.
2823
FLOOD, M.S.
3385
FLOQUET, J.
3362*
FLORIN, M.
3277
FLYNN, M.A.
2925
FOLCH, H.
2939
FOLDES, G.
3294
FOLSCH, U.R.
2753
FOLSCROFT, J.
3169*
FONDACARO, J.D.
2654*
FONTAINE, N.
2666
FONTANA, G.
3250
FORBES, J.
3121
FORDTRAN, J.S.
3100*
FORESTI, A.
3005
FORMAL, S.B.
2924
FORSSMANN, W.G.
2636*, 2882
FOURNET, J.
3238
FOURNIER, A.M.
2973
FOX, J.E.
2886
FOX, T.A., JR.
3002
FRAME, M.H.
2732
FRANCESCATTI, D.S.
2893*
FRANCESCHI, F.
3067
FRANK, D.F.
3188*
FRANK, W.D.
2862
FRANKLIN, E.
3322
FRASCHINI, P.
3090
FREEDMAN, A.R.
2944
FREIBURGHAUS, A.L.
3149*
FREIRE RODRIGUEZ, D.
3433
FRERICHS, F.
2667
FRESTON, J.W.
3079, 3121
FREXINOS, J.
2735
FREYCHET, P.
2783*
FRIC, P.
2985, 3173
FRIEHANDLER, L.
3011
FRIED, D.
3328
FRIEDMAN, H.I.
3143*
FRIEDMAN, H.S.
2780*
FRIGERIO, B.
2637*
FRISK, C.S.
2906*
FRITZE, E.
3288
FROSNER, G.G.
3326
FRY, M.M.
2908*
FUCHS, H.M.
2823
FUNADA, A.
3166
FURNELLE, J.
2766
FURTUNESCU, E.
3130
FURUSAWA, T.
2788*
FUSSEY, I.V.
3129
FUSTO, A.
3196
GABEL, H.
2947
GABUNIYA, R.I.
3419
GADACZ, T.R.
3048*
GAGINELLA, T.S.
2873*
GAGUA, A.M.
3295
GALAGHER, N.D.
2731

GALLETTI, P.M.
2804
GALLO, L.L.
2661*
GALMICHE, J.P.
2694
GAMBLIN, F.T.
3113
GAMSTATTER, G.
3282
GANGULI, P.C.
3128
GANGULY, A.K.
2726*
GANGULY, N.K.
3330
GANS, S.L.
2994
GARAGNANI, B.
3067
GARCIA-CALVO, M.
3019*
GARDNER, J.D.
2658*, 3412*
GARNICA, A.D.
3339*
GARROW, D.G.
2959*
GARVIN, P.J.
3180*
GARVIN, T.J.
2719
GASALY, P.
3446
GASBARRINI, G.B.
3329*
GAUSS, G.
2805
GAUTHIER, A.
3345
GAVALER, J.S.
2832
GAZE, H.
3149*
GEALL, M.G.
3347
GEARY, C.
3128
GEGINAT, G.
3405*
GEHRKE, C.W.
2925
GELBART, S.M.
2893*
GELINAS, M.D.
2777
GELLER, S.
3463*
GEOKAS, M.C.
2774
GERAMI, C.
3136*
GERARD, A.
3194
GERETY, R.J.
2856
GERHARDT, D.C.
3029
GERHARDT, K.C.
2925
GERNER, T.
2681*, 2698
GEROK, W.
2962*, 3336*, 3359*
GERSTENBERGK, L.V.
2934
GIACCSA, A.
3069, 3070
GIAMBRONE, M.A.
2642
GIBSON, R.G.
2840
GIELIS-PROPER, F.K.
3307*
GIERMANSKI, A.
2983
GIGER, M.J.
2841
GILARDONI, A.
2842
GILEV, Y.M.
2974
GILLESPIE, I.E.
3128
GIPSMAN, M.
2728
GIRARD, J.
2772
GIRARD, P.R.
2938
GIRAULT, F.
3352*
GIRI, S.
3077
GISLON, J.
2694
GIST, W.W.
3041
GITNICK, G.L.
3319
GITZELMANN, R.
3149*
GIUNTOLI, M.
3451
GLASS, G.B.J.
3068
GLYNN, M.F.X.
3163
GO, V.L.W.
2756, 2873*, 3228*
GOLBUS, M.S.
2820
GOLDBERG, B.
3015
GOLDBERG, H.I.
3399
GOLDBERG, M.J.
2895*
GOLDING, P.L.
3083
GOLDLUST, D.M.
3292
GOLDSTEIN, E.
2819
GOLDSTEIN, H.M.
3037, 3188*
GOMES, C.
3454*
GONCALVES, A.L.
3443
GONELLA, J.
2673*
GONZALEZ, J.P.
2970
GONZALEZ, M.C.
2826
GONZENBACH, R.
3273
GOODALL, R.J.R.
3026
GORDON, E.R.
3301
GORDON, H.E.
3097*
GORDON, S.J.
3159
GORE, R.W.
2897*
GORESKY, C.A.
3301
GORI, E.
2688
GOROBETS, V.F.
3419
GORODNICHENKO, L.I.
3420
GOSSELIN, D.
3101*
GOSSINK-SCHAAFSMA, E.H.
3150
GOTLIEB, A.
3328
GOTZ, M.
3357*
GRABNER, G.
2767
GRAF, B.
3286
GRAFF, R.J.
3180*
GRALNICK, H.
2854
GRANDITSCH, G.
3357*
GRANGE, D.
2945, 2946
GRANGER, D.N.
2900*
GRANGER, H.J.
2899*
GRANZOTTI, J.A.
3443
GREANEY, M.G.
3027, 3190
GREEN, J.R.B.
3338*
GREENLEE, H.B.
2893*
GREENSTEIN, A.J.
3463*
GREENWAY, C.D.
3400
GREGG, J.A.
3231*

GREGOIRE, A.
3275
GREGORY, D.H.
2791*
GREGORY, H.
2715, 3128
GREIM, H.
3390
GRELLET, J.
2979
GREWAL, S.S.
2711
GRIESSEN, M.
2722*, 3421
GRIFFEN, R.
3334
GRILLIAT, J.P.
3432
GRIMELIUS, L.
2727*, 3183*
GRONNEBERG, T.O.
2889
GROSBERG, S.J.
3341
GROSFELD, J.L.
3096*
GROSSMAN, M.I.
2909*, 3111
GROSSNER, D.
3052*
GROSZMANN, R.J.
3340
GROTZINGER, U.
2739
GRUNDY, S.M.
3391
GUARASCI, G.
3112
GUBETTA, L.
3314
GUDZENKO, Z.P.
3237
GUELRUD, M.
3374
GUEVARA, B.Q.
3383
GUIBAL, F.
3362*
GUL'DIAEV, V.G.
3276
GULLO, L.
3250
GUMUCIO, J.J.
2813
GUNTHNER, W.
3332*
GUPTA, R.C.
3455*
GUSTOT, P.
3344
GUYOT, M.
2866*
GUZEEVA, V.A.
3266
GYORKEY, F.
2641
GYORKEY, P.
2641
GYR, K.
2772
HAAG, M.
3336*
HAAS, P.A.
3002
HAASE, W.
2652*
HABIBULLAH, C.M.
2869*
HACKI, S.K.
2729
HACKI, W.
2772
HACKI, W.M.
2729
HADCHOUEL, M.
3279
HADORN, B.
3149*
HADZIYANNIS, S.J.
3317
HAENEY, M.R.
2999
HAFF, R.C.
3073
HAFFNER, J.F.W.
2681*, 2698
HAGEDORN, C.F.
2634*
HAGEL, J.
3051*
HAGENMULLER, P.
2695, 3376
HAGER, J.C.
2804
HAGHIGHI, P.
3136*
HAGHSHENASS, M.
3136*
HAHNE, W.F.
2658*
HAJJ, A.A.
3141*
HAKIM, A.A.
2867*
HALL, H.D.
2717
HALLBOOK, T.
3372
HALLORAN, L.G.
2791*
HALME, H.
3403*
HALTER, F.
2729, 3176
HALVORSEN, J.F.
3148*
HAMILTON, J.T.
2683*
HAMMILL, A.
2740
HANCOCK, D.M.
3060
HANKER, J.S.
2716
HANS, C.
2962*, 3336*
HANSEN, C.H.
3071
HANSKY, J.
3107
HANSSEN, L.E.
2759, 3219
HARDING, J.W.
3211
HARDING, L.K.
3132
HARDY, K.J.
2812, 3192
HARLOR, J.A.
3311
HARNARINE, C.
3043*
HARNED, R.K.
2958*
HARUUCHI, A.
2866*
HARRIES, J.T.
3167*
HARRIS, R.E.
3184*
HART, P.
2807
HARTEMANN, E.
3441
HARTIG, W.
3435, 3445
HARVEY, R.F.
2887
HASHIHIRA, S.
3229*
HASSANI, S.N.
3226
HATA, Y.
3272
HAURI, H.P.
3149*
HAWKES, R.A.
3311
HAWKINS, C.
3006
HAY, D.J.
3026
HAYASHI, M.
3000
HEALY, G.R.
3458*
HEATON, K.W.
2787*
HECHT, Y.
3292
HEDBERG, S.E.
3227
HELANDER, H.F.
2640*
HELL, K.
3072
HELLEMANS, J.
2881
HELLER, E.A.
2780*
HELLER, R.A.
2876*
HELLSTROM, K.
3258*

HELMAN, C.
3123, 3125
HELMER, F.
3357*
HELMSTAEDTER, V.
2636*, 2882
HELPAP, B.
3259*
HELWING, E.
3356*
HEMET, J.
3253*
HENDERSON, R.D.
3058
HENRY, W.
2771
HENTGES, D.J.
2925
HERMANT, C.
3365*
HERMANUS, A.
3233, 3234
HERNANDEZ, A.J.
3037
HERRERA, A.F.
3370
HERRMANN, G.
3282
HERSHMAN, J.M.
2719
HERZFELD, U.
2667
HESS, G.
3318
HEYDENRYCH, J.J.
3368
HIBLER, C.P.
3458*
HIGGINS, Y.K.
2924
HILDEBRAND, H.
2765
HINTNER, I.
2982
HIRSCHOWITZ, B.I.
2840
HISADOME, T.
2788*
HITTINGER, R.
3134
HO, C.S.
3380
HOARE, A.M.
3003, 3006
HOBSLEY, M.
2730, 3004, 3007
HOCK, F.J.
2710
HOEFER, R.A.
3408*
HOEFFEL, J.C.
3274
HOEFS, J.
2809
HOEPFFNER, W.
3178
HOFFMAN, A.F.
2785*
HOFFMAN, N.E.
2792*, 2812
HOFMANN, A.F.
2792*, 2963*, 2964*, 3387, 3388, 3390, 3398
HOFSTAD, T.
3148*
HOGAN, D.
3111
HOHENWALLNER, W.
3299*
HOLAN, K.R.
2815, 3382
HOLLENDER, L.F.
3241
HOLLINGER, F.B.
3306*
HOLMES, J.E.
2715
HOLMQUIST, A.L.
2931
HOLSCHER, B.
2805
HOLT, P.R.
2862
HOLT, S.A.
3040
HOLTERMULLER, K.H.
3126
HOLZBACH, R.T.
2815, 2818, 3382
HONDA, R.
2674*
HONIGSMANN, F.
3293
HOPF, U.
2935
HOPFER, U.
2649*
HOPMAN, P.J.
2743
HOPWOOD, D.
3261*, 3262*
HORSLEY, J.S., III
3182*
HORTON, L.W.L.
3139*
HOSOI, K.
2714
HOSTEIN, J.
3238
HOTTENROTT, C.
2934
HOUCKE, M.
3222
HOUGH, A.J.
2865*
HOUSTON, H.
2891
HOVDENAK, N.
3148*
HOWANIETZ, L.
3357*
HOWARD, C.R.
2856
HOWAT, H.T.
3214
HRYCEK, A.
2989
HSIA, Y.E.
3016
HUBENS, A.
3450
HUBSHER, J.A.
2763
HUDEPOHL, J.P.
3425
HUDSON, D.
2885
HUGHES, J.
2703
HULTEN, L.
2902*
HUMPHREY, C.S.
3220
HUNSTEIN, W.
2667
HUNT, R.H.
3083
HUNTER, J.D.
3084, 3351, 3401
HURWITZ, A.
3035
HURWITZ, A.L.
3053*
HUSBAND, J.
3008
HUSLAROVA, A.
2985
HUTTEMANN, U.
3036
IBER, F.L.
2808
IHM, P.
2669
IHSE, I.
2950*
IIDA, M.
3187*
IMHOF, H.
3440
IMLER, M.
3285
IMPICCIATORE, M.
2758
INOKAWA, H.
2796*
IRVIN, T.T.
3020*, 3027, 3129
ISAACSON, P.
2633*, 2907*
ISENBERG, J.I.
3111
ISHCHUK, O.E.
3290
ISHERWOOD, I.
3214
ISHII, H.
3055*
ISHIZAWA, M.
2707
ISRAEL, Y.
3335
ISSEROFF, H.
2938

ITO, M.
2661*, 3046*
ITO, S.
2637*
ITOH, H.
2788*
ITOH, Z.
2674*
ITOUA-NGAPORO, A.F.
3427
IWATA, H.
2874*
IWATSUKI, N.
2750*
JACKSON, J.
3050*
JACKSON, P.R.
3190
JACOB, G.
3369
JAFFE, B.M.
3413*
JAHNBERG, T.
2701, 2708
JAIN, S.
3331
JAMES, A.M.
2921
JAMES, J.
2831
JAMES, S.P.
3310
JANCOVA, M.
3175
JANES, J.
3014
JANES, N.J.
3144*
JANOWITZ, H.D.
3463*
JANSSENS, J.
2881
JANSSON, G.
2708
JARRETT, F.
3054*
JAUBERT DE BEAUJEU, M.
3441
JEEJEEBHOY, K.N.
3163
JENA, P.K.
3007
JENKINS, D.J.A.
2891
JENKINS, G.N.
2718
JEW, J.Y.
2800*
JIT, I.
2711
JOHANSSON, H.
2727*
JOHNSON, F.E.
2757, 2776, 3216
JOHNSON, L.F.
3034
JOHNSON, L.R.
2932
JOHNSON, R.O.
2994
JOLLY, R.D.
2948
JONES, A.L.
2647, 2836
JONES, E.A.
2854
JONES, R.S.
3053*, 3413*
JONES, S.A.
3400
JOPPICH, I.
3452
JORGENSEN, J.B.
2918
JOUBAUD, F.
3436
JOURDEN, M.
2926
JOYCE, S.
3171*
JUDD, M.A.
2633*, 2907*
JULER, G.L.
3207*
JULIEN, H.
2973
JUNG, F.
3154
JUNG, R.T.
3351
JUNQUERA, S.F.C.
2631*
KACHALAI, D.P.
3089
KADIAN, R.S.
2775
KADIR, S.
3227
KAFKA, E.
3402
KAGNOFF, M.F.
2912, 2913
KAIRALLA, A.B.
2937
KALAIDA, L.P.
3093
KALANT, H.
3335
KALINA, Z.
2989
KALLNER, M.
3258*
KALTWASSER, J.P.
2669
KAMINSKI, D.L.
2817
KANETA, K.
3270
KANGAS, K.
3403*
KANOVITCH, B.
3177
KANTELIUS, M.
2699
KAPLAN, M.S.
3207*
KAPLAN, S.
3402
KARESEN, R.
3219
KARVOUNTZIS, G.G.
3317
KASAI, Y.
3272
KASPER, D.L.
2904*
KASUGAI, T.
3009
KATZ, A.J.
2997
KAUFMAN, N.
2890
KAWAI, K.
3094*
KAWAI, T.
3270
KAYASSEH, L.
2772
KAZIC, T.
2678*
KECLIK, M.
2985
KEIGHLEY, M.R.B.
3003, 3006
KEITEL, R.
3286
KEITH, R.
3145*
KELLEHER, J.
3220
KELLER, M.
3176
KELLEY, R.E.
2821
KENNEDY, C.
3025
KENNIS, H.M.
2689
KERN, E.
2704
KERN, F., JR.
2797*, 2825
KERR, J.C.
2944
KERZNER, A.
3460
KEULEMANS, K.
2851
KEUPPENS, F.
2644
KEY, P.H.
3394
KHALIL, T.
2930
KHAMIS, B.
3025
KHAN, S.A.
3039
KHANNA, N.N.
2879*
KHARAZMI, A.
3136*
KHUBCHANDANI.
3200

KIEFFER, J.L.
2693
KIEFHABER, P.
3453
KIM, J.C.S.
2926
KIM, Y.S.
2892
KIMOTO, K.
3094*
KINGHAM, J.G.C.
3170*, 3330
KINSEY, M.D.
3159
KIRKS, D.R.
3018
KITAEV, V.V.
3091
KIZU, M.
3009
KLASTERSKY, J.
3194
KLATSKIN, G.
3257*
KLEHR, N.
3438
KLOPPER.
2743
KLYUEVA, Z.I.
3439
KNAPIK, Z.
2983
KNAUER, C.M.
3012
KNIAZ, J.
3340
KNIGHT, G.J.
3313
KNIGHT, W.A., JR.
3230*
KNIPP, J.E.
3385
KNIPPER, A.
3076
KNOBEN, J.M.A.M.
3150
KNOLLE, J.
3318
KNUTRUD, O.
3162
KOFFMAN, C.G.
3128
KOHATSU, S.
3061
KOHLER, K.
3286
KOHOUT, J.
2751*
KOJIMA, K.
3217
KOLASSA, N.
2870*
KONTUREK, S.J.
2742, 3102*, 3109
KOO, A.
2942
KOOP, C.E.
3408*
KOOPMAN, J.P.
2689
KOPELOVICH, L.
2953*
KORBOVA, L.
2751*
KOREPANOVA, G.A.
3267
KORMAN, M.G.
2963*, 2964*
KORNILOVA, S.N.
3428
KOROBKIN, M.
3399
KOSLOWSKI, L.
3461
KOTELNIKOV, V.P.
3245
KOTHE, W.
3445
KOTRLIK, J.
2985
KOWLESSAR, O.D.
3159
KOZINTSEVA, P.V.
3089
KRAFT, W.
2987
KRASNY, H.C.
2843
KRAUSE, S.
2808
KRAWITT, E.L.
2663*
KREEL, I.
3463*
KREEL, L.
2638*, 3068
KREMLEVA, L.A.
3267
KREULEN, D.
2675*
KREULEN, D.L.
2703
KRIEGER, R.
2962*
KRISTENSEN, M.
2892
KRUSTEV, L.P.
2859
KRYUGER, N.G.
2974
KUBO, H.
3055*
KUBOTA, K.
3046*
KUCHARCZYK, K.
2868*
KUGELBERG, C.
2950*
KUITUNEN, P.
3414
KUJAWA, M.
2868*
KUMAR, P.
3171*
KUMARAKULASINGHE, C.B.
3193
KUN, L.
3284
KUO, J.
2827
KUO, Y.J.
2651*
KUPFER, A.
2802
KURAMOTO, T.
2791*
KUROCK, W.
3282
KUZNETSOV, N.A.
3091
KWIECIEN, N.
3102*, 3109
KWONG, W.
2769
KYRAL, V.
3175
LA RUSSO, N.F.
2785*
LA SPADA, F.
3430
LABAYLE, D.
2979
LABIANCA, R.
3090
LABO, G.
3329*
LABORDA, O.E.
3370
LADITAN, A.A.O.
3415
LAIDLOW, J.M.
3083
LALLY, J.J.
3041
LALOUEL, J.M.
3050*
LAMARQUE, J.L.
2986
LAMB, S.G.
3309
LAMBERT, R.
3115
LAMI, F.
3218
LAMY, J.
2971
LANCASTER-SMITH, M.
3171*
LANDER, J.
3334
LANE, J.B.
2867*
LANE, W.
3111
LANGE, A.P.
3407*
LANGER, B.
3343, 3346, 3380
LANGMAN, M.J.S.
3078
LANKISCH, P.G.
3036

LAOUARI, D.
2866*
LARGMAN, C.
2774
LARSEN, G.L.
3073
LARSEN, J.K.
3071
LARSSON, L.I.
2712*
LASHCHEVKER, V.M.
3243
LAURENCE, B.
3375
LAURENT, J.
3362*
LAUTERBACH, H.H.
3085
LAUTERBURG, B.H.
2803
LAVEN, R.
2704
LAWRENCE, W., JR.
3182*
LAWSON, T.L.
3017
LE CAM, A.
2783*
LE LOET, C.
3253*
LEBREUIL, G.
3275
LECOMPTE, Y.
3397
LEE, W.C.
3080
LEGER, L.
3154
LEGLER, U.F.
2744
LEHMANN, F.G.
3271
LEHMANN, S.M.
3179*
LEIBOWITZ, A.I.
2853
LEIJD, B.
3258*
LEKOMTSEVA, G.A.
3439
LEMBERG, A.
2842
LEONOV, A.L.
3092
LEPELTIER, M.
2745
LESBROS, F.
3304
LESTER, R.
2822, 2824, 2832
LEV, R.
2635*
LEVE, M.D.
2938
LEVINSON, J.D.
3459*
LEVO, Y.
3322
LEWIS, T.D.
3146*, 3147*
LEYPOLD, F.
3440
LEZOCHE, E.
3077
LI, T.K.
2779*
LIANG, I.Y.S.
2942
LIAVAG, I.
3081
LICASTRO, R.
2849
LIEBER, C.S.
2780*, 3333
LIEBHART, M.
3426
LIEDBERG, G.
3131
LIFSON, N.
2867*
LIGUORY, C.
3352*
LILJA, P.
2950*
LIN, D.S.
2908*
LINDELL, B.
2778*
LINDON, R.L.
3309
LINDSTEDT, G.
2810
LING, V.
2777
LITTLE, J.M.
2822, 2824, 3256*
LLANCS, O.L.
2720*, 2762
LOBIS, I.F.
3024*
LOBO, F.
3060
LOEB, P.
3014
LOEHRY, C.A.
3170*
LOGINOV, G.I.
2671
LOGINOVA, N.S.
3324
LOISILLIER, F.
2929
LOMBARDO, L.
3095*
LONG, B.W.
3412*
LONG, J.M.
2733
LONGTON, R.W.
2713
LOPEZ, M.A.
2798*
LOPEZ-RIOS FERNANDEZ, F.
3433
LORD, A.
2764
LOVE, A.H.G.
3224
LOW-BEER, T.S.
2787*
LUBCZYNSKA-KOWALSKA, W.
2983
LUCHETTA, L.
3005
LUCKE, H.
2652*
LUKES, P.
3225
LUND, P.K.
2740
LUNDBERG, P.A.
2810
LUNDBLAD, R.L.
2795*
LUNDGREN, D.
2902*
LUNDHOLM, K.
2810
LUNDQVIST, G.
2727*, 3183*
LUPORINA, G.
3090
LUSHBAUGH, W.B.
2937
LUX, M.
3356*
LYFORD, C.L.
3169*
LYMAN, D.O.
3458*
LYNCH, H.T.
3184*
LYNCH, P.M.
3184*
MACCARRONE, N.
3444
MACDONALD, T.T.
2951*
MACGREGOR, I.L.
2682*, 2763
MACHELL, R.J.
3084
MACKINTOSH, C.E.
2638*
MACLEAN, C.J.
3050*
MACRAE, K.D.
3110
MACSWEEN, R.N.M.
2939
MADARNAS, P.
2764
MADSEN, T.
2700, 2705
MAEDA, M.
3010
MAEDA, S.
2874*
MAIER, W.P.
3024*
MAIKRANZ, P.A.
3001
MAIN, I.H.M.
2732, 2734, 2741

MAINGUET, P.
3406*
MAKAROVA, V.A.
3289
MAKHATILOV, M.M.
3283
MAKHLOUF, G.M.
2888
MAKINEN, K.K.
2713
MALAGELADA, J.R.
2848, 3122, 3228*
MALAGUTI, P.
3067
MALAKEWICZ, A.
2929
MALIK, S.A.
3230*
MALINOVSKY, Y.F.
3239
MALIS, F.
2751*
MALLINA, E.R.
3324
MALLINSON, C.N.
3215
MALLORY, A.
3040
MALMUD, L.S.
3021*, 3024*
MALT, R.A.
2864*, 3164
MANGLA, J.C.
3112
MANN, N.S.
2775, 2996
MANSBACH, C.M., II
3053*
MANSON, J.
3113*
MARCHENKO, V.A.
3092
MARCHEVSKY, N.
3120
MARCHISIO, V.
2965
MARCUS, M.
3312
MAREK, J.
2751*
MARGOLIS, A.
2866*
MARIANI, E.
3329*
MARKS, J.W.
3464*
MARLETTA, F.
3066
MARLICZ, K.
2981
MARQUES DA SILVA, E.
3454*
MARSH, M.
2815
MARSHALL, R.
3411*
MARTIN, A.
3115
MARTIN, F.
3101*
MARTIN, P.M.
2682*
MARTINEZ, A.
2031*
MARTINEZ-PINEIRO CARAMES, M.
3468
MARTINSON, J.
2708
MARUYAMA, M.
3166
MARZIO, L.
3146*, 3147*
MAS, A.
3342
MATERIA, A.
3077
MATERN, S.
2962*, 3336*
MATSESHE, J.W.
3388
MATSUBARA, F.
2639*
MATSUDA, T.
2874*
MATTEI, J.P.
2973
MATTES, P.
3085
MATTOSINHO FRANCA, L.C.
3460
MATYASHIN, I.M.
3239
MATZKU, S.
2954*
MAUDGAL, D.P.
3386
MAURI, M.
3342
MAY, B.
3288
MAY, J.P.
2969
MAY, R.J.
3412*
MAYBURY, N.K.
3004, 3007
MAYER, G.
3291
MAYER, S.
3291
MAYER, S.E.
2828
MAZER, N.A.
3392
MAZZARIELLO, R.M.
3373
MAZZELLA, G.
2949*
MCCALL, J.T.
3122, 3347
MCCARTHY, D.M.
3412*
MCCOLLUM, J.F.K.
3167*
MCCRAE, W.M.
3213*
MCDERMOTT, W.V., JR.
3255*
MCGILL, D.B.
2956*
MCGILL, D.G.
3467*
MCHARDY, G.
3022*
MCHATTIE, J.D.
3380
MCINTOSH, N.
3409*
MCKNIGHT, W.D.
3400
MCNAMARA, H.
2659*
MEBOLD, A.
3273
MEDLINE, A.
3335
MEEROFF, J.C.
3120
MEEROFF, M.
3120
MEIJER, D.K.
2851
MEIKLE, D.D.
3105*
MEIRE, H.B.
3008
MEISSNER, W.A.
3255*
MEL'NIKOV, R.A.
2972
MELLING, J.
2920
MELLON, W.S.
2838
MELLORS, A.J.
2653*
MELNICHENKO, L.Y.
3428
MELNICK, J.L.
3306*
MELON, C.
2746
MELSON, G.L.
3379
MENDELOFF, A.I.
3117
MENDELSON, R.
3330
MENDES DA COSTA, P.
3194
MENDZHERITSKY, I.M.
3423
MENUCK, L.
2648
MERCADIER, M.
3365*
MERCHANT, J.L.
2876*
MEREDITH, S.C.
3349
MERRILL, J.R.
3165
MERTENS, R.B.
2828

MESEROLE, L.
2650*
MESHALKIN, E.N.
3267
METREAU, J.M.
3397
MEUNIER, L.
3035
MEYER, H.
2898*
MEYER ZUM BUSCHENFELDE, K.H.
2935, 3318
MEYERS, M.A.
3465*
MIERZWA, P.
2989
MIGLIO, F.
3329*
MIGLIOLI, M.
3127, 3218
MIHAS, A.A.
2840
MIKOS, E.
3102*
MILANI, H.
3153
MILLER, B.
3422
MILLER, D.L.
2813
MILLER, T.A.
2720*
MILLER, W.C.
3211
MILLIGAN, F.D.
3186*
MILSAVLJEVIC, D.
2678*
MIN, K.H.
2641
MINER, P.B.
2837
MIRAS ESTACIO, M.
3468
MIRGUZE, J.
3431
MISAKI, F.
3094*
MISRA, N.P.
3455*
MITCHELL, C.J.
3220
MITCHELL, J.
3158
MITROPOULOS, K.A.
2789*
MITZNEGG, P.
2914
MIYAGI, F.
3055*
MIYAOKA, T.
3094*
MIYAZAKI, E.
2707
MLYNEK, H.J.
3435
MOK, H.Y.I.
3391
MOLINA, E.
2690
MOLINARI, F.
3069, 3070
MONEREO, J.
3269
MONERET-VAUTRIN, D.A.
3432
MONGES, H.
2696
MONMAUR, P.
2945
MONNIER, L.
3431
MONSON, R.C.
3339*
MONTGOMERY, C.
3216
MONTGOMERY, C.K.
2757
MONTGOMERY, R.R.
2999
MONTINARI, F.
3090
MOOG, F.
2877*
MOONEY, J.S.
2647
MOORE, H.D.
3191
MOORE, J.
3014
MORAN, J.
2737
MORECKI, R.
2642
MORI, R.
3229*, 3232*
MORICI, V.
3196
MORIN, C.L.
2777
MORISSET, J.
2755, 2764
MORITZ, K.
3453
MORLEY, J.E.
2719
MORRISON, S.A.
3348
MORSE, E.L.
2911
MORSON, B.C.
3465*
MORTENSSON, L.
2941
MORTILLARO, N.A.
2399*
MORTON, D.L.
3319
MORTON, N.E.
3050*
MOSBACH, E.H.
2793*
MOSER, H.
3248
MOSHAL, M.G.
3099*
MOSKOVSKAYA, M.A.
3203
MOSS, A.A.
3399
MOTOKI, T.
3327
MOTORIN, E.A.
2974
MOWAT, A.P.
3378
MULLER, D.P.R.
3167*
MULLER, F.
3178
MULLER, G.
2982
MULLER, N.
2940
MULLER-WIELAND, K.
3242
MUNJAL, D.
3042*
MURAD, S.
3327
MURATA, H.
3055*
MURAV'EVA, L.A.
3265
MURER, H.
2652*
MURILLO, A.
2798*
MURPHY, R.F.
2884
MURRAY, D.
3189*
MURRAY-LYON, I.M.
2861
MURZIN, B.A.
2972
NABOKOV, S.A.
3280
NAGAI, N.
3400
NAGASE, S.
2794*
NAGAYO, T.
3046*
NAGY, G.S.
3098*
NAHRWOLD, D.L.
2653*
NAKAMA, M.
3270
NAKAMA, T.
2788*
NAKAMURA, W.
3046*
NAKANISHI, M.
3202
NANCE, F.C.
3080
NARENDERAN, K.
2775
NARSETE, T.
3054*
NASF, K.
3136*

NASSAR, V.H.
3141*
NASTRO, L.J.
3459*
NATH, G.
3453
NAUCY, B.
2696, 2697
NAVARRO, M.D.
3383
NAVARRO, R.P.
3124
NAYLOR, F.
2723*
NEGREL, R.
2875*
NEGRO, P.
3360*
NEKI, T.
3082
NELSON, D.L.
2928
NELSON, R.S.
3037
NEMCHAUSKY, B.A.
3349, 3396
NEMER.
3200
NEMETH, T.J.
3143*
NERVI, F.
2829
NEUBAUER, J.
2782*
NEUMANN, S.
3445
NEWKIRK, M.
2890
NEWMAN, J.
3009
NEWTON, W.T.
3180*
NG, K.H.
2755
NICHOLS, R.L.
2895*
NIEL, J.P.
2673*
NILSSON, A.E.
3225
NILSSON, B.Y.
2699
NILSSON, J.
2941
NISHII, T.
3229*
NIZZE, H.
2752*
NOLAN, J.P.
2853
NORDBY, G.
2801*
NORDGREN, S.
2902*
NORTHFIELD, T.C.
3386
NORTON, L.W.
2957*, 3040
NORUM, K.R.
2801*
NOSSLIN, B.
2778*
NOUVET, G.
3253*
NOVA, R.
3175
NOVIKOFF, P.M.
2835
NOVIS, B.H.
3123
NUGENT, P.
3064
NYFORS, A.
3261*, 3262*
O'CONNOR, F.A.
2771
OBERLING, F.
3291
OBTULOWICH, W.
3109
OCCHIATO, V.
3196
ODES, H.S.
3123
ODIEVRE, M.
3279
OGATA, T.
3056*
OGAWA, S.
3270
OGINO, K.
2686, 2687
OGLESBY, S.E.
3116
OHMAN, U.
2923
OHSATO, K.
3187*
OJAKIAN, M.A.
2834
OJHA, S.C.
2879*
OKAMOTO, M.
3202
OKANO, K.
3010
OKAWA, T.
3270
OKAZAKI, I.
3333
OKUDA, T.
3056*
OKUN, K.
2725*
OKWUASABA, F.K.
2683*
OLAZABAL, A.
2727*
OLBE, L.
2739
OLD, J.M.
3060
OLEKSY, J.
3102*, 3109
OLINGER, E.J.
3412*
OLIVENCIA, J.A.
3059
OLIVER, J.M.
2887
OMAE, T.
3187*
ONDERDONK, A.B.
2904*
OP DEN ORTH, J.C.
2991
ORCI, L.
2637*
ORLIC, D.
2635*
ORLOWSKI, T.
3152
ORREGO, H.
3335
ORWELL, R.L.
3045*, 3057*
OSCARSON, J.
3131
OSHIBA, S.
3232*
OSIME, U.
3074
OSKRETKOV, V.I.
3205
OSMAN, C.G.
3321
OSSENBERG, F.W.
2695, 3358*
OSUNA, O.
2919
OTSUKI, M.
3010
OTT, B.J.
2956*
OTTEN, G.
3356*
OTTO, U.
3286
OVERBECK, G.
3106
OWENS, C.
3132
OWENS, M.L.
3097*
OWYANG, C.
2756
PAEZ, J.
2893*
PALACIN, A.
3366*
PALADE, G.E.
2773
PALASCIANO, G.
3223
PALAYEW, M.J.
3381
PALMA, R.
2816
PALME, G.
3405*
PANKO, P.P.
3093
PANKOV, V.I.
3245

PANCL, G.
2804
PANSU, D.
2748
PANVELIWALLA, D.
2827
PAP, A.
3363*
PAPELEUX, C.B.
2867*
PAPP, M.
2754
PAPPALARDO, G.
3249
PAPPERT, K.
3294
PARAF, A.
3337*
PARE, P.
3301
PARENTI, R.
2967
PARIS, A.L.
3255*
PARIS, J.
3427, 3469
PARIS, J.C.
3469
PARKS, T.G.
3110
PARNAS, J.
2918
PAROLARO, D.
2688
PASQUIS, P.
3253*
PASSARO, E., JR.
3097*
PATEL, S.
3346
PAUMGARTNER, G.
2786*
PAVLIDES, G.P.
3186*
PAYA, J.M.
3019*
PEARCE, E.I.F.
2718
PEARCE, J.B.
2734, 2741
PEARSE, A.G.E.
2643, 2727*, 2885
PEDERSEN, S.A.
2700
PEDERSEN, T.
3071
PEKARY, A.E.
2719
PELLETIER, N.
3305
PENNINGTON, C.R.
2960*
PERA, A.
3095*
PERA, C.
3366*
PEREZ-AVILA, C.
3020*
PEREZ-BERMAR PELAEZ, J.A.
3468
PERKIN, L.
3014
PERRAULT, J.
2956*
PERRET, C.
2738
PERRILLO, R.
3334
PERTSEMLIDIS, D.
2827
PESENDORFER, F.
3440
PETERSEN, H.
2736
PETERSEN, O.H.
2750*
PETERSON, W.L.
3100*, 3119
PETIT, C.A.
3041
PETYT, B.
3277
PFEIFFER, E.F.
2888
PHILLIPS, J.P.
3380
PHILLIPS, R.L.
3179*
PHILLIPS, S.F.
2657*, 2873*
PIERACH, C.A.
3260*
PIETTRE, G.
2693
PILLAY, C.V.
3099*
PILLET, P.
3436
PIN, G.
2696
PINDER, R.M.
3118
PINEDA, A.A.
2803
PIPER, D.W.
3045*, 3057*
PISARSKI, A.
3201
PISTOLESI, G.F.
3235
PITCHUMONI, C.S.
3068
PITTMAN, F.E.
2937
PIZZETTI, P.
3430
PLAZA, J.
3374
PLESKOTT, K.
3294
PLOCHL, E.
3299*
PODELL, E.
2724*
PODDNENKO-BOGDANOVA, A.P.
3204
POHLE, W.
3288
POIRIER, G.G.
2755
POISSON, J.
3198
POLAK, J.H.
2727*
POLAK, J.M.
2643, 2885
POLLOCK, D.J.
3172*
POLTERAUER, P.
2767
POLTO, F.
3196
POMELOVA, L.A.
3276
POPOV, V.A.
2670
POPPER, H.
3298
PORTELA-GOMES, G.
3183*
PORTERFIELD, G.N.
2721*
PORTNOY, L.M.
3092
POULSEN, S.S.
3208
POUPON, R.
3344
POUYET, M.
3297
POWELL, L.W.
2807
POXON, V.
3132
PRADAYROL, L.
2735
PRECZYNSKA, A.
3151
PREECE, J.W.
2716
PREISIG, R.
2786*
PREUMONT, A.M.
3065
PRIAN, G.W.
2957*
PRICE, S.F.
3031
PRIVETT, J.T.J.
3044*
PROSSER, C.L.
2675*
PROST, G.
3305
PROZOROVSKAYA, K.N.
3420
PSACHAROPOULOS, L.
3378
PUCILLO, A.
3463*
PULS, G.
3405*
PUPO NETO, J.C.
3197

PURCELL, R.H.
3318
PUTNAM, C.E.
3016
QIZILBASH, A.
3043*
QUILLEN, E.W.
2900*
QUINTANA, C.
2858
RAAB, K.
2974
RACUSEN, L.C.
2663*
RADULESCU, D.
2668
RAFES, Y.I.
3424, 3428
RAGASOL, A.
3292
RAHLF, G.
3036
RAKOWSKI, S.
3177
RAMIREZ, G.
3054*
RAMON Y CAJAL, S.
3019*
RAMSBY, G.
3023*
RANIERI, F.
2696
RANKIN, J.
3335
RAPP, W.
3063
RAPPAPORT, A.M.
3013
RAPTIS, S.
2887, 3085
RASARETNAM, R.
3193
RASKIN, J.B.
3402
RASMUSSEN, S.N.
3206*
RASZKE, K.
2981
RAUCHENBERGER, B.
3087
RAVAZOLA, M.
2637*
RAY, M.B.
3316
RAYFORD, P.L.
2720*, 2752, 2930
RAYMOND, T.L.
2908*
RAYYES, A.N.
2862
READ, A.E.
3221
REAVEN, E.P.
2655*
REAVEN, G.M.
2655*
REBER, H.A.
2757, 2776, 3216
REDDY, A.N.
3341
REED, J.E.
3116
REED, J.S.
3349
REES, B.I.
3369
REEVE, D.R.
2933
REFSUM, S.B.
3168*
REGAL, A.M.Y.
3061
REGAN, P.T.
3228*
REGGIO, H.
2773
REHFELD, J.F.
2712*
REICHEN, J.
2786*
REICHLE, F.A.
2847
REICHLE, R.M.
2847
REID, P.E.
2952*, 3462*
REINHARDT, G.F.
2893*
REITER, F.
3379
REITER, H.J.
3287
REITHERMAN, F.
2809
REMINGTON.
3200
RENNER, T.G.
2809
RERAT, A.
2770
REUNALA, T.
3403*
REUT, A.A.
2988
REY, J.F.
2875*
REYNOLDS, E.C.R.
3409*
RIBEIRO, B.F.
3375
RIBET, A.
2735
RICCI, P.
3127
RICHARDSON, C.T.
3100*
RICHARDSON, J.D.
3047*
RICHEY, J.E.
2824
RICOUR, C.
2672, 2866*
RIFKIN, G.D.
2905*
RIGAUD, M.
3305
RIKANS, L.E.
2844
RIPANI, R.
3250
RITTMANN, W.W.
2772
RIZZETTO, M.
3095*, 3308, 3314
ROA, E.
3374
ROBERTS, C.
3216
ROBERTS, M.
3375
ROBINSON, S.H.
3361*
RODA, A.
2949*
RODA, E.
2949*
RODES, J.
3342
RODGERS, B.M.
3339*
RODGERS, J.B.
2654*
ROGERS, I.T.
2925
ROITMAN, A.
3328
ROJKIND, M.
2642
ROMAN, C.
2673*
ROMANOVICZ, D.K.
2716
ROMERO, C.
3182*
ROMUSSI, M.
3103*
RONSKY, R.
2985
ROSCH, W.
3448
ROSE, R.C.
2653*
ROSENBERG, I.H.
2662*, 3349
ROSENFIELD, A.T.
3016
ROSENQUIST, C.J.
3061
ROSENTHALL, L.
2702
ROSETO, A.
2970
ROSS, I.N.
2999
ROSS, J.S.
2864*
ROSS, P.E.
2960*
ROSSELAND, A.
3353*
ROSSI, M.A.
2630*
ROTH, S.
3072

ROTHMAN, U.
2778*
ROUTIER, G.
3277
ROWLING, J.T.
3181*
ROYLANCE, J.
3044*
ROYS, G.
3207*
ROZE, C.
2747
RUA, E.C.
2849
RUDKOWSKI, A.
3201
RUIPEREZ POLO, S.
3433
RUSSELL, D.
2917
RUSSELL, J.C.B.
3214
RUSSELL, R.M.
3348
RUUD, T.E.
3353*
RUWART, M.J.
2817
RYAN, J.P.
2684*
RYAVE, S.
2684*
RYBACHKOV, V.V.
3265
RYMER, R.
2969
SACA, A.
3037
SACHAR, D.
3463*
SAEKI, M.
3232*
SAHEL, J.
2980
SAIDOV, G.S.
3283
SAITO, S.
2794*
SAKAI, Y.
3000
SAKAKIBARA, K.
2794*
SAKAMOTO, C.
3010
SAKR, F.
2764
SALA, M.
2688
SALAMAO, J.P.
2693
SALDUCCI, J.
2696, 2697
SALEM, P.A.
3141*
SALEN, G.
2793*
SALOMON, F.
2945, 2946
SAMA, C.
2949*
SAMARINA, G.Y.
3423
SAMITZ, M.H.
2992
SAMMONS, H.G.
2999
SAMPLINER, R.E.
3310
SANDER, L.D.
2932
SANDERS, D.J.
2740
SANDERSON, I.M.
3309
SANDLER, S.G.
3312
SANKAR, M.Y.
3060
SANTANGELO, G.
3444
SANTORO, F.
3456*
SARKAR, F.H.
2879*
SARLES, H.
3223
SARNA, S.K.
3146*, 3147*
SASAKI, Z.
3094*
SATHIAMOORTHY, S.S.
2726*
SATO, T.
3377
SAUVAGE, M.
2745
SAVE-SODERBERGH, J.
2947
SAVOSTIN, A.I.
3244
SAWICKI, W.
2868*
SAWYER, P.R.
3118
SAWYERR, O.I.
3180*
SAZONOV, A.M.
3092
SCANLON, E.F.
3165
SCHAAPS, J.P.
3456*
SCHAEFER, J.K.
3040
SCHAFMAYER, A.
2762
SCHARSCHMIDT, B.F.
2814, 3032
SCHATTENBERG, P.J.
2940
SCHEERSCHMIDT, G.
3178
SCHEFLAN, M.
3227
SCHEINER, C.
3275
SCHENKER, U.
3435
SCHERSTEN, T.
2810
SCHEUER, A.
3271
SCHIEKE, S.
2782*
SCHJONSBY, H.
3148*, 3156
SCHLEGEL, W.
2887
SCHMACK, B.
2744
SCHMID, R.
2814
SCHMIDT, E.
2704
SCHMIDT, H.D.
3364*
SCHMITT-KOPPLER, A.
3062
SCHMITZ, P.I.M.
3307*
SCHMUCKER, D.L.
2647, 2836
SCHNAUFER, L.
3408*
SCHNEIDER, C.
3438
SCHNEIDER, W.
3326
SCHNEYER, C.A.
2717
SCHOENFIELD, L.J.
2790*, 2871*, 3394
SCHOLING, W.E.
3354*
SCHON, M.
2842
SCHOON, I.M.
2739
SCHREINER, B.
2801*
SCHREURS, V.V.A.M.
2761
SCHROCK.
3200
SCHROETER, D.F.
3311
SCHUBERT, E.
2914
SCHULMAN, A.N.
3319
SCHULZ, I.
2782*
SCHULZ, U.
2954*
SCHULZE, K.
3189*
SCHUMPELICK, V.
3052*, 3087
SCHWARTZ, C.C.
2791*
SCHWARTZ, M.S.
3172*
SCHWARZER, R.
3286

SCHWENK, M.
3390
SCHWILLE, P.O.
3086
SCIARRETTA, G.
3067
SCOLLO, L.
3066
SCOTT, G.M.
3330
SCOTT, H.W.
2865*
SECHER, N.J.
3407*
SEETHARAM, B.
2724*, 2877*, 3157
SEHGAL, A.K.
2869*
SEIFERT, E.
2976, 2977
SEIGE, K.
2982
SELHUB, J.
2662*
SENEGAS, F.
2735
SENENKO, A.N.
3442
SENTHESHANMUGANATHAN, S.
3323
SERECZYNSKA, T.
3151
SERRANO SANCHEZ, P.A.
3468
SERRERO, G.
2875*
SEUFERT, O.
3405*
SEUFERT, R.M.
2934
SEVERIN, C.
2816, 2829
SEWING, K.F.
2744
SHACKELFORD, G.D.
3018
SHAFFER, E.A.
2702, 3301, 3355*
SHAH, S.B.
3418
SHAH, S.M.
3400
SHAHID, M.J.
3141*
SHALIMOV, A.A.
3290
SHALIMOV, S.A.
3236
SHAMOV, I.A.
3199
SHANBOUR, L.L.
2651*
SHARI, Z.D.
3330
SHASHIDHAR, S.
3418
SHAW, C.
3411*
SHAW, D.G.
3409*
SHAW, P.K.
3458*
SHAW, S.
2780*
SHEER, G.W., III
3370
SHERLOCK, S.
3252*, 3331
SHERMAN, M.
3411*
SHERRIFF, S.B.
2943
SHEVCHENKO, L.T.
2966
SHEVCHENKO, N.M.
2966
SHIMAMURA, J.
3011
SHIPLEY, F.
3056*
SHKARBAN, P.E.
3236
SHKURKO, V.A.
2968
SHVATKO, I.T.
3093
SHOUVAL (STEIGBUEGEL), D.
3312
SHOWALTER, R.B.
2797*
SHPONTAK, A.S.
3236
SHRADER, R.E.
2927
SHTERNOVA, V.V.
3439
SHUCK, T.
3029
SHULIAK, O.S.
3290
SHUPECK, M.
2811
SHURGAYA, A.P.
3267
SIBRANSKY, H.
2860
SIEGEL, N.J.
3016
SIEGEL, R.C.
2855
SIEWERT, R.
3033
SIGSTAD, H.
3168*
SILVA, J., JR.
2905*
SILVERMAN, L.
2706
SIMKO, V.
2821
SIMMONDS, R.J.
2921
SIMON, F.R.
2826, 2837
SIMON, V.
3427
SIMONOV, N.N.
2972
SIMPKINS, K.C.
3466*
SINCLAIR, J.C.
3320
SINCLAIR, S.P.
3457*
SINGER, C.R.J.
2939
SITO, E.
3109
SKAGEN, D.W.
3156
SKOOG, V.
3183*
SKORKA, G.
2782*
SLONE, F.L.
2857, 2936
SMALL, D.M.
3355*
SMALLWOOD, R.A.
2812
SMART, R.C.
2943
SMITH, C.R.
2844
SMITH, F.R.
3348
SMITH, I.S.
3108
SMITH, J.W.
2895*
SMITH, W.I., JR.
2857, 2936
SMITHSON, K.W.
3031
SMOLIANSKY, B.L.
3088
SMULEWICZ, J.J.
3226
SNYDER, D.
2839
SOARES DA SILVA, A.
3197
SOEHENDRA, N.
3076
SOETERS, P.B.
2831
SOLC, P.
3175
SOLCIA, E.
2637*
SOLETO SAEZ, E.
3433
SOLING, H.D.
2753
SOLOMON, T.
2736
SOLOWAY, R.D.
3395
SOMOGYI, J.
2754
SONGSTER, C.L.
3001

SONNENBERG, A.
2737
SOPRANI, A.
3154
SORBELLO, A.
3444
SORMANN, G.W.
3192
SOROKA, A.M.
3290
SOTNIKOV, V.N.
2975
SPEIGHT, T.M.
3118
SPELLMAN, S.J.
2702
SPERANZA, V.
3077
SPINELLI, P.
3430
SPRUGEL, W.
2914
STABLES, R.
2733
STADAAS, J.O.
2709
STALDER, G.A.
2772
STALPORT, J.
2692
STAMFORD, I.F.
2629*
STANDAERT, L.O.
3449
STANKO, R.T.
2911
STANOWSKI, E.
3152
STARKEY, B.
3006
STARZEWSKI, J.
3201
STARZYK, H.
2983
STEFANINI, G.F.
3329*
STEFANINI, P.
3360*
STEIN, G.N.
3370
STEIN, T.
3142*
STEMPEL, J.M.
3393
STENBERG, B.
3225
STENDER, H.S.
2976
STENGG, R.
2870*
STENHOUSE, N.S.
2723*
STEVENS, R.D.
2845
STEVENSON, G.
2955*
STEVENSON, N.R.
2872*
STEWART, M.G.
2894*
STOCKLEY, H.L.
2629*
STOFFELS, G.L.
3065
STOKSTAD, E.L.R.
3325
STONE, R.M.
3346
STORER, E.
3340
STOSIEK, P.
3049*
STRAUS, E.
3114
STREMPLE, J.
3068
STREULI, Y.L.
2833
STRICKLAND, R.G.
3211
STROHMEYER, G.
3422
STROSBERG, M.A.
2990
STRUM, W.B.
2664*
STRUNZ, U.
2744
STRUNZ, U.T.
2909*
STRUYVEN, J.
3234
STUNKAT, R.
3326
SUCHODOLSKI, R.
3151
SUDORGIN, V.E.
3205
SUGG, U.
3326
SUGIHARA, P.T.
3179*
SUKAN, G.
2901*
SUMNER, D.S.
3140*
SUPALA, S.
3448
SUTHERLAND, A.
2951*
SUTHERLAND, E.
2837
SUTTER, V.L.
3179*
SVENDSEN, L.B.
3071
SWAMY, A.
3112
SWAN, K.G.
2944
SWARTS, H.G.P.
2761
SWASH, M.
3172*
SWIERCZEK, J.
3102*
SWIERCZEK, J.S.
2720*, 2762
SYROTA, A.
3337*
SYROTUCK, J.A.
2650*
SZABO, D.
2754
SZELKE, M.
2885
SZOLLOSI, G.
3363*
SZURSZEWSKI, J.H.
2703
SZYMANSKA, K.
2868*
SZYMANSKI, Z.
2981
TABOR, E.
2856
TAGHIZADEH, A.
3409*
TAKAHASHI, N.
2685
TAKAYANAGI, R.
2674*
TAKEDA, Y.
3229*
TAKEUCHI, A.
2924
TAKEUCHI, S.
2674*
TALBERT, J.L.
3339*
TAMURA, T.
3325
TANDON, B.N.
3185*
TANDON, H.D.
3185*
TANDON, R.K.
3185*
TANGEDAHL, T.N.
3388
TANIYAMA, K.
2686
TARPILA, S.
3403*
TASLER, J.
2742
TASWELL, H.F.
2803
TAUB, M.
3394
TAUGNER, C.
2882
TAVARELA VELOSO, F.
3454*
TAYLER, R.
3045*
TAYLOR, A.E.
2900*
TAYLOR, B.R.
3343
TAYLOR, I.
2943, 3181*
TAYLOR, I.L.
2758

TAYLOR, K.J.W.
3016
TAYLOR, R.H.
2998, 3083
TAYLOR, W.F.
2956*
TEAGUE, R.
3209
TEARLE, P.V.
2894*
TEICHMANN, R.K.
2762
TEMPLE, J.G.
3026
TERZ, J.J.
3182*
TESTA, H.J.
3214
THALER, M.M.
2820
THANGAPREGASSAM, M.J.
2945, 2946
THAYER, W.R.
2804
THEUNE, A.
2982
THISTLE, J.L.
3387, 3388
THOMAS, H.C.
2939, 3331
THOMAS, P.J.
2657*
THOMPSON, H.
3003
THOMPSON, J.C.
2720*, 2762, 2930
THOMPSON, K.G.
2948
THOMPSON, M.R.
2728
THOMPSON, R.P.H.
3350
THORSEN, G.
3353*
TIGHE, J.R.
3139*
TIILIKAINEN, A.
3414
TIM, L.O.
3123
TIMON-DAVID, P.
2973
TINCCO, J.
2834
TINT, G.S.
2793*
TITOVA, L.S.
3439
TOBIAS, H.
3322
TODA, K.
3202
TOLG, M.
3062
TOLOT, F.
3303
TOMPKINS, R.K.
3145*
TONI, A.
3218
TORRANCE, H.B.
3214
TORSVIK, H.
3168*
TOUSSAINT, J.
3233
TOWNE, D.
2854
TREADWELL, C.R.
2661*
TREBOUX, M.
3297
TRINDER, P.
3060
TROFIMOV, G.A.
3442
TRUELOVE, S.C.
3105*
TRUPIN, J.
2763
TRUSWELL, A.S.
3417
TSUYA, A.
3270
TSYB, A.F.
2974
TUCHMANN, B.
3440
TUDOR, J.
3401
TURCOTTE, J.
2963*, 2964*
TURINE, J.B.
3406*
TURNHEIM, K.
2870*
TURCVSKY, B.M.
3092
UCHINO, J.
3272
UDUPA, K.N.
2879*
UEHA, T.
2714
UMECA, M.
2794*
UNE, T.
2896*
USMANOV, D.U.
3324
USPENSKY, V.M.
2968
UVNAS, B.
2712*
UVNAS-WALLENSTEN, K.
2712*
VAGNE, M.
2738
VAHCUNY, G.V.
2661*
VAKILI, K.
3153
VAKILI, K.A.
3153
VALDIVIESO, V.
2816, 2825
VAN BERGE HENEGOUWEN, G.P.
2785*, 2792*, 3398
VAN DER REIS, L.
3075
VAN KLEY, H.
3230*
VAN THIEL, D.H.
2822, 2824, 2832, 2857, 2936
VAN VLOTEN, W.A.
3410*
VANDENBURG, M.J.
3172*
VANKEMMEL, M.
3222
VANTRAPPEN, G.
2881
VARANCHEVA, L.N.
3439
VARAS LORENZO, M.J.
2984
VARGA, A.
3049*
VARRO, V.
3363*
VASILIEV, P.N.
3281
VASILIEV, R.K.
3280
VASU, M.
3039
VATIER, J.
2745, 2747
VAZQUEZ LLAMAS, G.
3433
VEKSLER, Y.I.
3199
VELASCO, J.M.
3433
VELFL, D.
2646
VENDRELL, B.
2986
VENTRUCCI, M.
3250
VERITA, M.
2767
VERME, G.
3308, 3314
VICTOR, T.A.
3165
VIDA, S.
3251
VIDDAL, K.O.
3162
VIGONI, M.
3195
VINIK, A.I.
3125
VINOT, J.M.
3337*
VIRAGH, S.
2754
VISAKORPI, J.K.
3414
VLAHCEVIC, Z.R.
2791*

VOELLMY, W.
3176
VOGTEN, A.J.M.
3264
VOITENKO, A.A.
3239
VOKL, A.
2768
VOLPICELLI, N.A.
3211
VON WIETERSHEIM, A.
2710
VONK, R.J.
2851
VOSSE, A.
3362*
VRINTS, L.
3150
VULLIOUD, G.
2842
WACIARZ, M.
3120
WAGGONER, J.G.
2854
WAGLE, A.
3137*
WAGNER, I.
3246
WAGNER, I.U.
3357*
WAGNER, J.E.
2906*
WAISMAN, J.
3145*
WAITZ, R.
3291
WAKABAYASHI, A.
3229*, 3232*
WALKER, R.
2901*
WALKER, W.A.
2883
WALLIN, L.
2705
WALSH, J.H.
2758, 2909*, 2931, 3100*
WAMSTEKER, H.
3160
WANAT-CHROMY, M.
2989
WANITSCHKE, R.
2656*
WAPNICK, S.
3341
WARD, D.W.
3025
WARM, K.
3161
WARNER, H.A.
3189*
WARNER, S.
2908*
WASTELL, C.
3104*
WATANABE, H.
3187*
WATERFALL, W.E.
3146*, 3147*
WATERMAN, S.
2998
WATKINS, J.B.
2819
WATRIN, B.
3362*
WATSON, C.J.
3260*
WATSON, L.C.
2930
WATT, C.M.H.
3145*
WATTS, H.D.
3032
WAY, L.W.
3413*
WEI, R.
3313
WEIGEL, R.
2675*
WEILL, J.
2971
WEINERT, W.
3354*
WEISS, E.B.
3371
WEISS, G.N.
3371
WEISSMAN, A.
2979
WEITERING, J.G.
2851
WEITHOFER, G.
3161
WELCH, J.P.
3164
WELLS, J.G.
3457*
WENCEL, D.
2981
WENDLING, P.
3364*
WENNSTROM, C.J.
3166*
WERNER, B.
3076
WERNER, E.
2669
WHEELER, H.C.
2828
WHELTON, M.J.
3404*
WHITE, T.T.
3212*
WHITE, W.D.
3400
WHITFIELD, P.F.
2730
WICKS, A.C.B.
2787*
WICKSTROM, J.
2947
WIDERLITE, L.
3064
WIENBECK, M.
3422
WIERZBICKI, Z.
3102*
WILANDER, E.
3183*
WILBERT, L.
3036
WILCOX, L.L.
3079
WILEY, Z.D.
2682*
WILKE, E.
3246
WILLEMS, G.
2644
WILLIAMS, J.A.
2749*
WILLIAMS, M.A.
2834
WILLIAMS, R.
2861, 3302*, 3315, 3321
WILLIAMS, T.H.
2800*
WILLIAMSON, C.E.
3384
WILLIAMSON, R.C.N.
2864*
WILLMAN, V.L.
3180*
WILLSHIRE, I.R.
2715
WILSON, J.F.
2830
WILSON, S.E.
3097*
WINCHESTER, D.P.
3165
WINIECKI, P.
3435
WINSHIP, D.H.
3029
WIRTANEN, G.
3054*
WISE, L.
3142*, 3144*
WITZEL, L.
2729
WOLBERG, W.
3054*
WOLEK, M.
2983
WOLF, G.
3440
WOLTER, C.
2996
WONG, J.
3256*
WONG, M.F.
2757, 2776
WOOD, B.T.
3458*
WOODWARD, E.R.
3030
WOOLF, I.L.
3315
WORKMAN, E.F., JR.
2795*
WORTH, A.J.
2952*
WORTHINGTON, B.S.
2650*

WOUSSEN-COLLE, M.C.
2746
WRAIGHT, E.P.
3401
WROBEL, D.M.
3320
WU, C.H.
2642
WUNSCH, E.
2914
WURBS, D.
3376
WURSTER, K.H.
3063
WYLLIE, J.C.
2890
YABLONSKI, M.E.
2867*
YAGMUR, S.S.
3424
YALOW, R.S.
3114
YAMADA, S.
3046*
YAMAGISHI, T.
2679*
YAMANAKA, T.
3202
YAMASAKI, M.
3377
YAMASAKI, T.
3010
YAO, T.
3187*
YARZUTKIN, V.V.
2974
YAU, W.M.
2676*
YEATES, J.
2787*
YEH, K.Y.
2877*
YEH, Y.Y.
2833
YOSHIDA, T.
3055*
YUU, H.
3010
ZALEWSKI, H.
2981
ZAMBRANO, V.
3374
ZANGL, A.
3434
ZANNONI, V.G.
2844
ZAPIACH, L.
3068
ZAVENIAN, Z.S.
3276
ZAVERNY, L.G.
3239
ZEE, P.
2833
ZEMAN, F.J.
2927
ZFASS, A.M.
2868
ZHLOBA, A.F.
2978
ZHURAVLYOV, V.A.
3281
ZIEGLER, M.M.
3408*
ZILLESSEN, E.
2667
ZIMMERMAN, D.H.
3313
ZIMMERMANN, A.
3176
ZIMMON, D.S.
2990
ZINK, J.R.
2916
ZOLLER, M.
2954*
ZUCKERMAN, A.J.
2856, 3315
ZUCKERMAN, G.
3334
ZUCKERMAN, L.
3158
ZUCOLOTO, S.
2630*
ZUIDEMA, G.D.
3048*
ZURETTI, M.F.
2806

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

ABDOMEN
ANGIOGRAPHY
COMPLICATIONS, 3140*
DISEASE, 3434
MYCOSES, 3203
NERVOUS SYSTEM
GASTRIN, 2712*

ABSCESS
LIVER, 3276
AMEBIASIS, 2937
DIAGNOSIS, 3017
ULTRASONOGRAPHY, 3017

ABSORPTION
ASCITES, 2916
BILE ACIDS AND SALTS
CHEMICAL COMPOSITION, 2786*
KINETICS, 2786*
DUODENUM
CALCIUM, 2874*
INTESTINE, SMALL
IRON, 2890
LIPIDS, 2655*
SURGERY, 3156
INTESTINES
VITAMIN D, 3350
XYLOSE, 2999
MALABSORPTION SYNDROMES
DISACCHARIDES, 3178
MONOSACCHARIDES, 3178
XYLOSE
TECHNIQUES, 2999

ACETYLCHOLINE
LIVER
METABOLISM, 2842

ACHALASIA
ESOPHAGUS
NERVOUS CONTROL, 3019*
ULTRASTRUCTURE, 3019*

ACID PHOSPHATASE
GASTRITIS
DIAGNOSIS, 2989

ACID SECRETION
SEE ALSO SECRETION
ADRENERGIC RECEPTOR BLOCKADERS
PENTAGASTRIN, 2725*
DRUG EFFECTS ON
H2 RECEPTOR ANTAGONISTS, 2729, 3100*, 3124
ULCER, PEPTIC, 3127
DUODENUM
ULCER, PEPTIC, 3108
H2 RECEPTOR ANTAGONISTS, 3079
REVIEW, 3124
HORMONE EFFECTS ON
CHOLECYSTOKININ, 2736
PENTAGASTRIN, 2736
SECRETIN, 2736
STOMACH
ADRENERGIC RECEPTOR AGONISTS, 2733
ADRENERGIC RECEPTOR BLOCKADERS, 2733
AMINO ACIDS, 2742
ANTACIDS, 3122

ACID SECRETION (continued)
STOMACH (continued)
CALCIUM, 2741
CHOLECYSTOKININ, 2736
DISTENTION, 2739
DRUG EFFECTS ON, 2729, 3100*, 3122, 3124, 3127
GASTRIN, 3111
H2 RECEPTOR ANTAGONISTS, 2729, 3122, 3124
HISTAMINE, 2734
HORMONE EFFECTS ON, 2736, 3102*
INSULIN, 3004
ION TRANSPORT, 2728, 2730
JEJUNUM, 2746
MITOSIS, 3071
NUTRITION DISORDERS, 3418
PENTAGASTRIN, 2736
PROSTAGLANDINS, 2732
PROTEINS, 3111
PURINES, 2745
REFLUX, 2730
SECRETIN, 2736
SOMATOSTATIN, 3102*
ULCER, PEPTIC, 2988, 3053*, 3102*, 3111
VAGOTOMY, 2747, 3004, 3007
ZOLLINGER-ELLISON SYNDROME, 3446
ULCER, PEPTIC
ANTACIDS, 3126
CALCIUM, 3126
DIAGNOSIS, 2988
HORMONE EFFECTS ON, 3102*
MAGNESIUM, 3126
PROGNOSIS, 3007
VAGOTOMY, 3131

ACIDITY
ESOPHAGEAL REFLUX
DIAGNOSIS, 3020*
STOMACH
NUTRITION DISORDERS, 3418

ACYLTRANSFERASES
PLASMA
PHYSICAL ACTIVITY, 2821

ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
BILE
CIRCULATION, 2817
COLON
DRUG EFFECTS ON, 2871*
DIARRHEA
ETIOLOGY, 2871*
GALLBLADDER
BILE ACIDS AND SALTS, 2828
STOMACH
SYNTHESIS, 2737

ADENOSINE TRIPHOSPHATASE
LIVER, 2837

ADENYL CYCLASE
INTESTINE, SMALL
HORMONE EFFECTS ON, 2873*
HORMONES, GASTROINTESTINAL, 2873*
SECRETION, 2873*

ADOLESCENCE
CHOLELITHIASIS
CHOLECYSTECTOMY, 3357*
DIAGNOSIS, 3357*

ADRENERGIC RECEPTOR AGONISTS
STOMACH
ACID SECRETION, 2733

ADRENERGIC RECEPTOR BLOCKADERS
ACID SECRETION
PENTAGASTRIN, 2725*
STOMACH
ACID SECRETION, 2733
SECRETION, 2725*

AFFERENT LOOP SYNDROME
DUODENUM, 3155

AFLATOXINS
TOXICITY
FASCIOLIASIS, 2919

ALBUMINS
LIVER
SYNTHESIS, 2810

ALCOHOL DEHYDROGENASES
SEE ALCOHOL OXIDOREDUCTASES

ALCOHOL OXIDOREDUCTASES
ALCOHOLS
METABOLISM, 2779*
CHEMICAL PROPERTIES, 2779*
LIVER
KINETICS, 2781*

ALCOHOLIC LIVER DISEASE
SEE LIVER DISEASES, ALCOHOLIC

ALCOHOLISM
AMINO ACIDS
METABOLISM, 2911
AUSTRALIA ANTIGEN
DISEASES ASSOCIATED WITH, 3327
COLLAGEN
ENZYMES, 3333
METABOLISM, 3333
DIAGNOSIS
ENZYMES, 2971
DISEASES ASSOCIATED WITH
COLLAGEN DISEASES, 3333
DRUG METABOLISM
BREATH TEST, 2808
GASTRITIS
GASTRIN, 3068
GASTROINTESTINAL SYSTEM
HEMORRHAGE, 3225
HEPATITIS
DISEASES ASSOCIATED WITH, 3327
HEPATITIS, INFECTIOUS
DISEASES ASSOCIATED WITH, 3327
IMMUNOGLOBULINS, 2936
INTESTINAL ABSORPTION
AMINO ACIDS, 2651*
GLUCOSE, 2651*
MACROMOLECULES, 2650*
XYLOSE, 2668

ALCOHOLISM (continued)
INTESTINE, SMALL
ION TRANSPORT, 2651*
ULTRASTRUCTURE, 2630*
LIVER
CIRCULATION, 2780*
DRUG METABOLISM, 2808
GLUCONEOGENESIS, 2911
LIVER CIRRHOSIS
DRUG THERAPY, 3348
VITAMIN A, 3348
PANCREAS
BICARBONATE SECRETION, 2757
MORPHOLOGY, 2757
PSEUDOCYSTS, 3225
SECRETION, 2757, 3223
PANCREATIC DISEASES
PATHOLOGY, 3217
PANCREATITIS, 2757
SERUM
GASTRIN, 3068
IMMUNOGLOBULINS, 2857
TRANSPORT
GLUCOSE, 2651*
UROGENITAL SYSTEM
SEX FACTORS, 2832

ALCOHOLS
ALCOHOL OXIDOREDUCTASES
METABOLISM, 2779*
ALDEHYDES
OXIDOREDUCTASES, 2779*
HEPATITIS, INFECTIOUS
DRUG EFFECTS ON, 2856
INTESTINAL ABSORPTION
AMINO ACIDS, 2651*
GLUCOSE, 2651*
INTESTINE, SMALL
ION TRANSPORT, 2651*
TOXICITY, 2886
JEJUNUM
TOXICITY, 2886
LIVER
REGENERATION, 2862
TRIGLYCERIDES, 2830
LIVER INJURY
ENZYMES, 2782*
OXIDOREDUCTASES, 2782*
SERUM
FATTY ACIDS, 2830
TRANSPORT
AMINO ACIDS, 2651*
GLUCOSE, 2651*

ALDEHYDES
ALCOHOLS
OXIDOREDUCTASES, 2779*
OXIDOREDUCTASES
CHEMICAL PROPERTIES, 2779*

ALKALINE PHOSPHATASE
CHOLESTASIS
DIAGNOSIS, 3334
METABOLISM, 3334
SERUM, 3334
CIRCADIAN RHYTHM
FEEDING, 2872*
COLITIS, ULCERATIVE
DIAGNOSIS, 2982

ALKALINE PHOSPHATASE (continued)
FECES
ISOENZYMES, 2982
GASTRITIS
DIAGNOSIS, 2989
INTESTINES
CIRCADIAN RHYTHM, 2872*
FEEDING, 2872*
FETUS, 2872*
LIVER DISEASES, ALCOHOLIC
DIAGNOSIS, 3334
METABOLISM, 3334
SERUM, 3334
PANCREATIC DISEASES
DIAGNOSIS, 2982

ALLERGY
SEE HYPERSENSITIVITY

ALPHA 1 ANTITRYPSIN
DEFICIENCY
CHILD, 3279
FAMILIAL FACTORS, 3278
LIVER
DEFICIENCY, 3278, 3279

ALPHA-CHAIN DISEASE
EPIDEMIOLOGY, 3136*

ALPHA FETOPROTEIN
CYSTIC FIBROSIS
SERUM, 3213*
GASTROINTESTINAL SYSTEM
NEOPLASMS, MALIGNANT, 2984
PANCREAS
CYSTIC FIBROSIS, 3213*

AMEBIASIS
COLITIS
COMPLICATIONS, 3460
PERFORATION, 3460
COMPLICATIONS
PERFORATION, 3460
DIAGNOSIS
ANEMIA, 3454*
HEMATOLOGY, 3454*
RESPIRATORY SYSTEM, 3454*
INTESTINES
DRUG THERAPY, 3455*
LIVER
ABSCESS, 2937
DIAGNOSIS, 3454*

AMINES
LIVER
REGENERATION, 3339*
PARENTERAL ALIMENTATION
SYNTHESIS, 2932
STRESS
SYNTHESIS, 2932

AMINO ACIDS
COLON
RADIOLOGY, 2973
HEPATOCYTES
TRANSPORT, 2783*
INTESTINAL ABSORPTION, 2652*
ALCOHOLISM, 2651*
ALCOHOLS, 2651*
BACTERIAL INFECTIONS, 2665*

AMINO ACIDS (continued)
INTESTINAL ABSORPTION (continued)
BILE ACIDS AND SALTS, 2657*
CALCIUM, 2874*
DRUG EFFECTS ON, 2651*
INTESTINE, SMALL
TRANSPORT, 2652*, 2657*
JEJUNUM
TRANSPORT, 2657*
LIVER
TRANSPORT, 2783*
METABOLISM
ALCOHOLISM, 2911
STOMACH
ACID SECRETION, 2742
TRANSPORT
ALCOHOLS, 2651*
HORMONE EFFECTS ON, 2783*

AMINO TRANSFERASES
HEPATITIS
SERUM, 3323
TRIGLYCERIDES, 3323
HEPATITIS, INFECTIOUS
DENTISTRY, 3310
SERUM, 3323
TRIGLYCERIDES, 3323

AMMONIA
FECES
DIETARY FACTORS, 2891
LIVER
REGENERATION, 2861

AMPULLA OF VATER
SEE VATER'S AMPULA

AMYLASES
COLITIS, ULCERATIVE
DIAGNOSIS, 2982
FECES
ISOENZYMES, 2982
LIVER
SERUM, 2809
PANCREAS
NEOPLASMS, MALIGNANT, 3011
SECRETION, 2750*, 2760
PANCREATIC DISEASES
DIAGNOSIS, 2982, 3010
ISOENZYMES, 3010
PANCREATITIS, 3229*
CLEARANCE STUDY, 3238
DIAGNOSIS, 3010
ISOENZYMES, 3010
SALIVA, 2713
SECRETION
DRUG EFFECTS ON, 2750*

ANEMIA
AMEBIASIS
DIAGNOSIS, 3454*

ANEMIA, PERNICIOUS
DIGESTION, 3169*
INTESTINAL ABSORPTION, 3169*

ANESTHESIA
LAPAROSCOPY, 3430
LIVER
CIRCULATION, 3268

ANESTHETICS
LIVER
CIRCULATION, 2941

ANEURYSM
DUODENUM
ARTERIES, 3227
DIAGNOSIS, 3227
GASTROINTESTINAL SYSTEM
ARTERIES, 3433
PANCREAS
ARTERIES, 3227
DIAGNOSIS, 3227

ANGIOGRAPHY
ABDOMEN
COMPLICATIONS, 3140*
AORTA
COMPLICATIONS, 3140*
COMPLICATIONS
INFARCTION, 3140*
INTESTINE, SMALL, 3140*
DUODENUM
OBSTRUCTION, 2980
STENOSIS, 2980
INTESTINE, SMALL
INFARCTION, 3140*
OBSTRUCTION, 2980
LIVER
CIRCULATION, 2941
STOMACH
NEOPLASMS, MALIGNANT, 2972

ANOMALY
BILE DUCTS
REVIEW, 2648
DIAPHRAGM
PANCREATITIS, 3436
ESOPHAGEAL REFLUX, 3032
GALLBLADDER
RADIOLOGY, 3377
ILEUM, 3160
INTESTINE, SMALL, 3160
FIBRINOLYSIS, 3163
LIVER, 3277
MITOCHONDRIA
OBESITY, 3143*
PANCREAS, 3222
PYLORUS
ETIOLOGY, 3075
STOMACH
CYTOLOGY, 3056*
MORPHOLOGY, 3056*
VATER'S AMPULLA, 3222

ANOMALY, CONGENITAL
ILEUM
ATRESIA, 3162
INTESTINE, SMALL
ATRESIA, 3162
JEJUNUM
ATRESIA, 3162

ANTACIDS
DUODENUM
ULCER, PEPTIC, 3119, 3120, 3122, 3126
ESOPHAGEAL REFLUX
ESOPHAGITIS, 3022*
ESOPHAGUS
REFLUX, 3034
GASTROINTESTINAL DISEASES
CHILD, 3423
DRUG THERAPY, 3423
STOMACH
ACID SECRETION, 3122
DIGESTION, 3423
PEPTIDE HYDROLASES, 3423
ULCER
PREVENTION, 2934
ULCER, PEPTIC
ACID SECRETION, 3126
DRUG THERAPY, 3078, 3122
HEALING, 3119
PAIN, 3119

ANTI-INFLAMMATORY AGENTS
FOLIC ACID
ENZYMES, 2662*
INTESTINAL ABSORPTION
FOLIC ACID, 2662*
TRANSPORT
FOLIC ACID, 2662*

ANTIBIOTICS
BILE
BILE ACIDS AND SALTS, 3385
COLITIS
DRUG-INDUCED, 2904*, 2905*
COLON
SURGERY, 3194
FECES
BILE ACIDS AND SALTS, 3385
INTESTINE, SMALL
DRUG EFFECTS ON, 2869*
MORPHOLOGY, 2869*
LIVER CIRRHOSIS
ASCITES, 3344
EDEMA, 3344
LIVER INJURY
CARBON TETRACHLORIDE, 2853
ENTEROTOXINS, 2853
PREVENTION, 2853
PANCREATITIS
DRUG THERAPY, 3239
RECTUM
SURGERY, 3194

ANTIBODIES
AUSTRALIA ANTIGEN
CARRIER STATE, 3317, 3318
DENTISTRY, 3310
HEPATITIS, 3326
HEPATITIS, CHRONIC, 3317
PROGNOSIS, 3320
HEPATITIS, INFECTIOUS
AUSTRALIA ANTIGEN, 3315
CARRIER STATE, 3317
DENTISTRY, 3310
PROGNOSIS, 3319
HEPATITIS, SERUM, 3326
INFLAMMATORY BOWEL DISEASES, 3211

ANTIBODIES (continued)
INTESTINE, SMALL
SECRETION, 2883
LIVER CIRRHOSIS, 3317
PROGNOSIS, 3320
LIVER DISEASES, 3317
STOMACH DISEASES
HYPERSENSITIVITY, 3089

ANTICHOLINERGIC AGENTS
SEE PARASYMPATHOLYTICS

ANTIDIARRHEALS
DIARRHEA
DRUG THERAPY, 3407*

ANTIEMETICS
SECRETION
GASTRIN, 3103*
SERUM
GASTRIN, 3103*

ANTIGEN, AUSTRALIA
SEE AUSTRALIA ANTIGEN

ANTIGEN, CARCINOEMBRYONIC
SEE CARCINOEMBRYONIC ANTIGEN

ANTIGENS
AUSTRALIA ANTIGEN
CARRIER STATE, 3318
COLITIS, ULCERATIVE
IMMUNOLOGY, 3206*
FEEDING
IMMUNITY, 2912, 2913
LYMPHATIC SYSTEM, 2912, 2913
GASTROINTESTINAL SYSTEM
NEOPLASMS, MALIGNANT, 2984
HEPATITIS, CHRONIC
IMMUNOLOGY, 3316
PROGNOSIS, 3320
HEPATITIS, INFECTIOUS
IMMUNOLOGY, 3316
PROGNOSIS, 3319
INTESTINES
IMMUNITY, 2912, 2913
LYMPHATIC SYSTEM, 2912, 2913
LIVER CIRRHOSIS
PROGNOSIS, 3320
MALABSORPTION SYNDROMES
MILK, 3414
STOMACH, 2929
STOMACH DISEASES
HISTOLOGY, 3063
IMMUNOLOGY, 3063

ANTINEOPLASTIC AGENTS
BILE DUCTS
MORPHOLOGY, 3262*
ULTRASTRUCTURE, 3262*
HEPATOCYTES
MORPHOLOGY, 3261*
ULTRASTRUCTURE, 3261*
LIVER
DRUG EFFECTS ON, 3261*, 3262*
MORPHOLOGY, 3261*, 3262*
ULTRASTRUCTURE, 3261*, 3262*

ANTINEOPLASTIC AGENTS (continued)
PANCREATITIS
DRUG EFFECTS ON, 2751*
DRUG THERAPY, 2751*
STOMACH
ULCER, PEPTIC, 3054*
ULCER, PEPTIC
DRUG-INDUCED, 3054*

ANTIOXIDANTS
HEPATITIS, TOXIC
PREVENTION, 2840
LIVER INJURY
PREVENTION, 2840

ANTITRYPSIN
SEE TRYPSIN INHIBITORS

ANTITRYPSIN, ALPHA
SEE ALPHA 1 ANTITRYPSIN

ANTRECTOMY
SERUM
GASTRIN, 3132
STOMACH
MOTILITY, 2679*, 3132

ANTRUM
GASTRIN
CELLS, 3095*
GASTRITIS, 3095*
PARENTERAL ALIMENTATION, 2932
STRESS, 2932
SYNTHESIS, 2740, 2744
ULCER, PEPTIC, 3095*
MOTILITY
ELECTRICAL CONTROL, 2680*
ESOPHAGEAL REFLUX, 3023*
ESOPHAGITIS, 3023*
GASTRIN, 2698
HORMONE CONTROL, 2698
HORMONE EFFECTS ON, 2698
MOTILIN, 2698
NERVOUS CONTROL, 2680*
VAGOTOMY, 2747

ANUS
FISSURE
ETIOLOGY, 3198
REVIEW, 3198
SECRETION
LIPIDS, 2889
SURGERY
TECHNIQUES, 3195
TRANSPLANTATION, 3195

AORTA
ANGIOGRAPHY
COMPLICATIONS, 3140*

APPENDICITIS
COMPLICATIONS
MYCOSES, 3203
DIAGNOSIS
SEX FACTORS, 3204

APPENDIX
MYCOSES, 3203

ARTERIES
DUODENUM
ANEURYSM, 3227
GASTROINTESTINAL SYSTEM
ANEURYSM, 3433
FISTULA, 3039
PANCREAS
ANEURYSM, 3227

ASCITES
ABSORPTION, 2916
LIVER CIRRHOSIS
ANTIBIOTICS, 3344
DRUG THERAPY, 3344
HORMONES, ADRENAL CORTEX, 3342
RENIN, 3342

ASCORBIC ACID
SEE VITAMIN C

ASPIRIN
STOMACH
DRUG EFFECTS ON, 2721*

ATRESIA
BILE DUCTS
DIAGNOSIS, 3378
ETIOLOGY, 3378
THERAPY, 3378
ILEUM
ANOMALY, CONGENITAL, 3162
INTESTINE, SMALL
ANOMALY, CONGENITAL, 3162
JEJUNUM
ANOMALY, CONGENITAL, 3162

ATROPHY
HEPATOCYTES
STARVATION, 2859
LIVER
STARVATION, 2859
VILLI
GIARDIASIS, 3459*

ATROPINE
ILEUM
MOTILITY, 2686
INTESTINE, SMALL
MOTILITY, 2686
PANCREAS
BICARBONATE SECRETION, 2759
PEPTIDES, 2758
SECRETION
SECRETIN, 2759

AUSTRALIA ANTIGEN
ANTIBODIES
DENTISTRY, 3310
CARRIER STATE
ANTIBODIES, 3317, 3318
ANTIGENS, 3318
HEPATITIS, CHRONIC, 3320
LIVER CIRRHOSIS, 3320
DISEASES ASSOCIATED WITH
ALCOHOLISM, 3327
SYPHILIS, 3327
EPIDEMIOLOGY, 3311
HEPATITIS, CHRONIC
IMMUNOLOGY, 3316

AUSTRALIA ANTIGEN (continued)
HEPATITIS, INFECTIOUS
ANTIBODIES, 3315
DENTISTRY, 3310
EPIDEMIOLOGY, 3309
IMMUNOLOGY, 3316, 3321
PROGNOSIS, 3319
HEPATOCYTES
TECHNIQUES, 3314
LIVER
TECHNIQUES, 3314
RADIOIMMUNOASSAY
TECHNIQUES, 3313
TRANSMISSION, 3311

AUTORADIOGRAPHY
PANCREAS
SULFATES, 2773

BACTERIA
COLON
DIETARY FACTORS, 3179*
NEOPLASMS, MALIGNANT, 2895*
ENTERITIS, 2906*
FECES
DIETARY FACTORS, 2894*, 2895*, 3179*
INFANT, 2894*
MILK, 2894*
NEONATE, 2894*
INTESTINES, 2924
DIETARY FACTORS, 2894*
GASTRECTOMY, 2893*
INFANT, 2894*
MILK, 2894*
NEONATE, 2894*
VAGOTOMY, 2893*
MILK, 3420
VITAMIN B12
METABOLISM, 3137*

BACTERIAL INFECTIONS
ESCHERICHIA COLI
VACCINES, 2918
INTESTINAL ABSORPTION
AMINO ACIDS, 2665*
INTESTINE, SMALL
VITAMIN B12, 3137*
INTESTINES
BREATH TEST, 2949*
DIAGNOSIS, 2949*
ESCHERICHIA COLI, 2918
FECES, 2949*
VACCINES, 2918
PANCREAS
NEOPLASMS, MALIGNANT, 3231*
PANCREATITIS
COMPLICATIONS, 3231*
DIAGNOSIS, 3231*

BARIUM
COLON
RADIOLOGY, 3188*
ENEMA
TECHNIQUES, 2979
GASTROINTESTINAL SYSTEM
MUCUS, 2921
INTESTINES
MUCUS, 2921

BARIUM (continued)
STOMACH
MORPHOLOGY, 2638*
MUCUS, 2921

BICARBONATE SECRETION
SEE ALSO SECRETION
PANCREAS
ALCOHOLISM, 2757
ATROPINE, 2759
CALCIUM, 2762
DRUG EFFECTS ON, 2759
ENTERECTOMY, 2777
HORMONE EFFECTS ON, 2760
MAGNESIUM, 2762
OBSTRUCTION, 2776
SECRETIN, 2771
THYROCALCITONIN, 2760
PANCREATIC DUCT
OBSTRUCTION, 2776

BILE
BILE ACIDS AND SALTS
ANTIBIOTICS, 3385
CHENODEOXYCHOLIC ACID, 3389
DRUG EFFECTS ON, 3385
VAGOTOMY, 3393
CHEMICAL COMPOSITION
SHUNT, INTESTINAL, 3142*
CHOLESTEROL, 2818
CHENODEOXYCHOLIC ACID, 3391
DRUG EFFECTS ON, 3391
MENSTRUAL CYCLE, 2787*
SOLUBILITY, 2815
STEROLS, 3388
VAGOTOMY, 3393
CIRCULATION
ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2817
BILE ACIDS AND SALTS, 2817
COLITIS, ULCERATIVE
LIPIDS, 3464*
ENTERECTOMY
LIPIDS, 3464*
GASTRECTOMY
REFLUX, 3006
GASTRITIS
BILE ACIDS AND SALTS, 3048*
REFLUX, 3048*
ILEITIS
LIPIDS, 3464*
INFLAMMATORY BOWEL DISEASES
LIPIDS, 3464*
LIPIDS
AGE FACTORS, 2816
CHENODEOXYCHOLIC ACID, 2790*
CHROMATOGRAPHY, 2845
DRUG EFFECTS ON, 3395
GILBERT'S DISEASE, 3301
MENSTRUAL CYCLE, 2787*
PHOSPHOLIPIDS, 3382
PHYSICAL ACTIVITY, 2821
VAGOTOMY, 3393
OBESITY
CHOLESTEROL, 3391
PANCREAS
SECRETION, 3212*
PERITONITIS
PROGNOSIS, 3368

BILE (continued)
SECRETION, 2813
CHOLECYSTOKININ, 2798*
ESTROGENS, 2826
HORMONE EFFECTS ON, 2798*, 2826
PANCREOZYMIN, 2798*
SECRETIN, 2798*
TRANSPORT
MICELLES, 2814
TRIGLYCERIDES
MENSTRUAL CYCLE, 2787*

BILE ACIDS AND SALTS
ABSORPTION
CHEMICAL COMPOSITION, 2786*
KINETICS, 2786*
BILE
ANTIBIOTICS, 3385
CHENODEOXYCHOLIC ACID, 3389
CIRCULATION, 2817
DRUG EFFECTS ON, 3385
VAGOTOMY, 3393
BILIARY TRACT DISEASES
DIAGNOSIS, 2960*
SERUM, 2960*
CHOLELITHIASIS
DRUG THERAPY, 3388, 3392
KINETICS, 2792*
METABOLISM, 2792*
STEROLS, 3388
CHOLESTASIS
EXCRETION, 3359*
CHOLESTEROL
SOLUBILITY, 2788*
CIRCULATION
KINETICS, 3336*
COLON
DRUG EFFECTS ON, 2871*
DIARRHEA
ETIOLOGY, 2871*
FECES
ANTIBIOTICS, 3385
DRUG EFFECTS ON, 3385
GALLBLADDER
ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 2828
TRANSPORT, 2828
GALLSTONES
SOLUBILITY, 3392
GASTRITIS
BILE, 3048*
HYPERLIPOPROTEINEMIA
SYNTHESIS, 3258*
INTESTINAL ABSORPTION
AMINO ACIDS, 2657*
CARBOHYDRATES, 2657*
FATTY ACIDS, 2656*
FOLIC ACID, 2657*
GLUCOSE, 2657*
PHOSPHOLIPIDS, 2654*
XYLOSE, 2657*
KINETICS
RADIOIMMUNOASSAY, 3336*
LIVER
CIRCULATION, 2784*, 2785*, 3336*
LIVER DISEASES
DIAGNOSIS, 2960*, 2961*
FEEDING, 2961*
SERUM, 2960*, 2961*

BILE ACIDS AND SALTS (continued)
MALABSORPTION SYNDROMES
BREATH TEST, 2949*
DIAGNOSIS, 2949*
FECES, 2949*
METABOLISM, 2793*, 2819
AGE FACTORS, 2816
CHOLECYSTECTOMY, 2791*
DETERGENTS, 2825
DRUG EFFECTS ON, 2825
ESTROGENS, 2825
FETUS, 2820
PORTACAVAL SHUNT, 2827
TECHNIQUES, 2792*
RADIOIMMUNOASSAY
TECHNIQUES, 2963*, 2964*
SECRETION
DIETARY FACTORS, 2823
FETUS, 2824
STEROIDS, 2824
SERUM
RADIOIMMUNOASSAY, 2962*, 2963*
STOMACH
ION TRANSPORT, 2723*
SYNTHESIS
DIABETES, 2829
FETUS, 2812, 2822, 2824
STEROIDS, 2822, 2824
TRANSPORT
DETERGENTS, 2826
HORMONE CONTROL, 2850
PITUITARY GLAND, 2850
THYROID GLAND, 2850

BILE DUCTS
ANOMALY
REVIEW, 2648
ATRESIA
DIAGNOSIS, 3378
ETIOLOGY, 3378
THERAPY, 3378
CALCULI
REVIEW, 2648
CELLS
MORPHOLOGY, 2641
ULTRASTRUCTURE, 2641
CHOLANGIOGRAPHY
REVIEW, 2648
CHOLANGITIS
CHOLANGIOGRAPHY, 3396
REVIEW, 2648
DILATATION
DIAGNOSIS, 3399
TOMOGRAPHY, 3399
ULTRASONOGRAPHY, 3399
DRUG EFFECTS ON
ANTINEOPLASTIC AGENTS, 3262*
ENDOSCOPY
COMPLICATIONS, 3353*
HYPERPLASIA
FASCIOLIASIS, 2938
INFLAMMATION
REVIEW, 2648
LIVER
NEOPLASMS, MALIGNANT, 3259*
MANOMETRY
ENDOSCOPY, 3375
TECHNIQUES, 3375

BILE DUCTS (continued)
MORPHOLOGY
ANTINEOPLASTIC AGENTS, 3262*
DRUG EFFECTS ON, 3262*
NEOPLASMS
REVIEW, 2648
OBSTRUCTION, 3367
SHUNT, INTESTINAL
CHOLELITHIASIS, 3142*
ULTRASONOGRAPHY
REVIEW, 2648
ULTRASTRUCTURE
ANTINEOPLASTIC AGENTS, 3262*
DRUG EFFECTS ON, 3262*

BILE SALTS
SEE BILE ACIDS AND SALTS

BILIARY CIRRHOSIS
SEE LIVER CIRRHOSIS, OBSTRUCTIVE

BILIARY TRACT
CHOLELITHIASIS
THERAPY, 3373
ENDOSCOPY, 2975
OBSTRUCTION
CHOLESTASIS, 2858
SECRETION, 2813
HORMONE EFFECTS ON, 2763, 2826
TUBERCULOSIS
PROGNOSIS, 3368

BILIARY TRACT DISEASES
CHOLAGOGUES AND CHOLERETICS, 3354*
DIAGNOSIS
BILE ACIDS AND SALTS, 2960*
ENDOSCOPY, 2975
ULTRASONOGRAPHY, 2957*, 2959*
ENDOSCOPY
COMPLICATIONS, 3353*
LIVER INJURY
OXYGEN, 3265
THERAPY, 3265
SERUM
BILE ACIDS AND SALTS, 2960*
SURGERY
SEQUELAE, 3360*

BILIRUBIN
KERNICTERUS
BRAIN, 2800*
DEAFNESS, 2800*
ULTRASTRUCTURE, 2800*
LIVER
METABOLISM, 2811
METABOLISM
JAUNDICE, 3361*
SCANNING, SCINTILLATION
TECHNIQUES, 2848

BILIRUBIN ENCEPHALOPATHY
SEE KERNICTERUS

BIRTH
SEE PREGNANCY

BLADDER
SEE UROGENITAL SYSTEM

BLEEDING
SEE ALSO HEMORRHAGE
DUODENUM
LASER, 2922
THERAPY, 2922
FECES
TECHNIQUES, 3001
GASTROINTESTINAL SYSTEM, 3039
DIAGNOSIS, 3001
LASER, 2922
THERAPY, 2922
LIVER
BIOPSY, 3012
STOMACH
LASER, 2922
THERAPY, 2922

BLOOD
HEPATITIS, 3326
HEPATITIS, SERUM, 3326
INTESTINAL OBSTRUCTION
SEROTONIN, 2879*
SEROTONIN
SEPSIS, 2879*

BLOOD FLOW
SEE CIRCULATION

BOMBESIN
SEE HORMONES, GASTROINTESTINAL

BONES
ENTERECTOMY
COMPLICATIONS, 3139*

BURNS, CHEMICAL
COLON, 3205
RECTUM, 3205

CADMIUM
LIVER
DRUG METABOLISM, 2843
ENZYMES, 2843

CALCIFICATION
LIVER
ETIOLOGY, 3018
HERPESVIRUSES, 3018
INFECTION, 3018
NEONATE, 3018
TOXOPLASMOSIS, 3018
VIRUS DISEASES, 3018
PANCREATITIS, CHRONIC
RADIOLOGY, 3234

CALCITONIN
SEE THYROCALCITONIN

CALCIUM
BINDING
ENTERECTOMY, 2866*
DUODENUM
ABSORPTION, 2874*
TRANSPORT, 2874*
ULCER, PEPTIC, 3126
ENTERECTOMY
DEFICIENCY, 3139*
GALLSTONES
GROWTH SUBSTANCES, 3384

CALCIUM (continued)
ILEUM
ION TRANSPORT, 2685
INTESTINAL ABSORPTION, 2666
AMINO ACIDS, 2874*
INTESTINE, SMALL
BINDING, 2866*
ION TRANSPORT, 2666, 2685
ION TRANSPORT
CHOLECYSTOKININ, 2658*
DRUG EFFECTS ON, 2658*
HORMONE EFFECTS ON, 2658*
PANCREAS
BICARBONATE SECRETION, 2762
ION TRANSPORT, 2658*
SECRETION, 2761
RECTUM
MOTILITY, 2687
STOMACH
ACID SECRETION, 2741
ION TRANSPORT, 2707
MOTILITY, 2707
ULCER, PEPTIC
ACID SECRETION, 3126
ZOLLINGER-ELLISON SYNDROME
DIAGNOSIS, 3413*

CALCULI
BILE DUCTS
REVIEW, 2648

CANCER
SEE NEOPLASMS

CARBOHYDRATES
CECUM
DIET, 2901*
COLON
COLITIS, ULCERATIVE, 3209
INTESTINAL ABSORPTION
BILE ACIDS AND SALTS, 2657*
FATTY ACIDS, 2657*
GLUCOSE, 2659*
PANCREAS
SECRETION, 2768

CARBON TETRACHLORIDE
LIVER
LIPIDS, 2846
MICROSOMES, 2846
LIVER INJURY
ANTIBIOTICS, 2853
ENTEROTOXINS, 2853

CARCINOEMBRYONIC ANTIGEN
COLON
CHROMATOGRAPHY, 3042*
IMMUNOLOGY, 3042*
COLONIC DISEASES
CHROMATOGRAPHY, 3042*
DIAGNOSIS, 3042*
IMMUNOLOGY, 3042*
GASTRITIS, ATROPHIC, 3064
HISTOCHEMISTRY, 2907*
IMMUNOLOGY, 2907*
INTESTINE, SMALL
MORPHOLOGY, 2633*
ULTRASTRUCTURE, 2633*

CARCINOEMBRYONIC ANTIGEN (continued)
STOMACH
NEOPLASMS, BENIGN, 3064
NEOPLASMS, MALIGNANT, 3064
STOMACH DISEASES, 3064
DIAGNOSIS, 3042*
HISTOLOGY, 3063
IMMUNOLOGY, 3063

CARCINOGENS
LIVER
CYSTS, 2799*

CARCINOID TUMOR
GASTROINTESTINAL SYSTEM
THERAPY, 3164
RECTUM
IMMUNOLOGY, 3183*

CARDIOVASCULAR SYSTEM
GASTROINTESTINAL SYSTEM
DISEASE, 3437

CATALASE
SALIVARY GLANDS, 2716

CECUM
SEE ALSO INTESTINE, LARGE
DIET
CARBOHYDRATES, 2901*
INTUSSUSCEPTION
GEOGRAPHICAL FACTORS, 3193
MYCOSES, 3203
POLYPS
DIAGNOSIS, 3166
RADIOLOGY, 3166

CELIAC DISEASE
DISEASES ASSOCIATED WITH
GRANULOMA, 3168*
IMMUNOGLOBULINS, 3171*
INTESTINE, SMALL
PERMEABILITY, 3170*

CELL CULTURE
LIVER
TECHNIQUES, 2804
PANCREATIC DUCT
TECHNIQUES, 2753

CERULEIN
DUODENUM
MOTILITY, 2677*

CHEMICAL BURNS
SEE BURNS, CHEMICAL

CHEMOTHERAPEUTIC AGENTS
SEE ANTINEOPLASTIC AGENTS

CHEMOTHERAPY
SEE DRUG THERAPY

CHENODEOXYCHOLIC ACID
BILE
BILE ACIDS AND SALTS, 3389
CHOLESTEROL, 3391
LIPIDS, 2790*

CHENODEOXYCHOLIC ACID (continued)
CHOLELITHIASIS
DRUG THERAPY, 3389, 3390
THERAPY, 3386
GALLSTONES
SOLUBILITY, 3389
LIPIDS
CHOLESTEROL, 2790*
STOMACH
ION TRANSPORT, 2723*
TOXICOLOGY, 3390

CHILD
ALPHA 1 ANTITRYPSIN
DEFICIENCY, 3279
CHOLELITHIASIS
CHOLECYSTECTOMY, 3357*
DIAGNOSIS, 3357*
DIAPHRAGM
HERNIA, 3441
ESOPHAGUS
FISTULA, 2994
GASTROENTERITIS
EOSINOPHILS, 3408*
GASTROINTESTINAL DISEASES
ANTACIDS, 3423
DRUG THERAPY, 3423
ETIOLOGY, 3439
GASTROINTESTINAL SYSTEM
HEMORRHAGE, 3451
GIARDIASIS
EPIDEMIOLOGY, 3457*
TRANSMISSION, 3457*
LIVER
CLEARANCE STUDY, 2849
NEOPLASMS, 3272
NEOPLASMS, MALIGNANT, 3275
MALABSORPTION SYNDROMES
ETIOLOGY, 3439
NUTRITION DISORDERS, 3443
PROGNOSIS, 3415
PANCREATITIS
DIAGNOSIS, 3237
THERAPY, 3244
PANCREATITIS, CHRONIC
DIAGNOSIS, 3237
SHIGELLOSIS
EPIDEMIOLOGY, 3457*
TRANSMISSION, 3457*
ULCER, PEPTIC
ETIOLOGY, 3096*

CHOLAGOGUES AND CHOLERETICS
BILIARY TRACT DISEASES, 3354*

CHOLANGIOGRAPHY
BILE DUCTS
CHOLANGITIS, 3396
REVIEW, 2648
JAUNDICE, OBSTRUCTIVE
DIAGNOSIS, 3400
PANCREATITIS, CHRONIC
DIAGNOSIS, 3234

CHOLANGITIS
BILE DUCTS
CHOLANGIOGRAPHY, 3396
REVIEW, 2648
ODDI'S SPHINCTER
ENDOSCOPY, 3352*

CHOLECYSTECTOMY
BILE ACIDS AND SALTS
METABOLISM, 2791*
CHOLELITHIASIS
ADOLESCENCE, 3357*
CHILD, 3357*

CHOLECYSTITIS
DIAGNOSIS
REVIEW, 3381
ODDI'S SPHINCTER
ENDOSCOPY, 3352*
RADIOLOGY
REVIEW, 3381

CHOLECYSTOGRAPHY
CONTRAST MEDIA, 3015
TECHNIQUES, 3014

CHOLECYSTOKININ
ACID SECRETION
HORMONE EFFECTS ON, 2736
CELLS
MORPHOLOGY, 2885
DUODENUM
MOTILITY, 2677*
GALLBLADDER
MOTILITY, 2684*, 2702
ION TRANSPORT
CALCIUM, 2658*
RADIOIMMUNOASSAY
PEPTIDES, 2915
TECHNIQUES, 2915
SECRETION
BILE, 2798*
STOMACH
ACID SECRETION, 2736
MOTILITY, 2681*

CHOLEDOCHOLITHIASIS
SEE COMMON BILE DUCT CALCULI

CHOLELITHIASIS
SEE ALSO GALLSTONES
ADOLESCENCE
CHOLECYSTECTOMY, 3357*
DIAGNOSIS, 3357*
BILE ACIDS AND SALTS
KINETICS, 2792*
METABOLISM, 2792*
STEROLS, 3388
BILIARY TRACT
THERAPY, 3373
CHILD
CHOLECYSTECTOMY, 3357*
DIAGNOSIS, 3357*
CHOLESTEROL
ETIOLOGY, 3383
SECRETION, 3394
SYNTHESIS, 3394
CLASSIFICATION
REVIEW, 3381
COLITIS, ULCERATIVE
DISEASES ASSOCIATED WITH, 3464*
CONTRACEPTIVES, ORAL, 3371
DIAGNOSIS, 3371
REVIEW, 3381

CHOLELITHIASIS (continued)
DIETARY FACTORS
CHOLESTEROL, 3386
STEROLS, 3386
DISEASES ASSOCIATED WITH
REVIEW, 3355*
DRUG THERAPY, 3383
BILE ACIDS AND SALTS, 3388, 3392
CHENODEOXYCHOLIC ACID, 3389, 3390
ENZYMES, 3425
PHOSPHOLIPIDS, 3382
STEROLS, 3388
ENTERECTOMY
DISEASES ASSOCIATED WITH, 3464*
ETIOLOGY
REVIEW, 3381
HORMONES, 3371
ILEITIS
DISEASES ASSOCIATED WITH, 3464*
INFLAMMATORY BOWEL DISEASES
DISEASES ASSOCIATED WITH, 3464*
INTESTINAL OBSTRUCTION
COMPLICATIONS, 3116
PATHOLOGY
REVIEW, 3355*
PREVENTION, 3383
RADIOLOGY
REVIEW, 3381
SEX FACTORS, 3371
SHUNT, INTESTINAL
BILE DUCTS, 3142*
COMPLICATIONS, 3142*
STOMACH
MOTILITY, 3356*
THERAPY, 3383
CHENODEOXYCHOLIC ACID, 3386
REVIEW, 3355*
VAGOTOMY, 3393

CHOLERETICS
SEE CHOLAGOGUES AND CHOLERETICS

CHOLESTASIS
ALKALINE PHOSPHATASE
METABOLISM, 3334
BILE ACIDS AND SALTS
EXCRETION, 3359*
BILIARY TRACT
OBSTRUCTION, 2858
CONTRACEPTIVES, ORAL, 3371
DIAGNOSIS, 3371
ALKALINE PHOSPHATASE, 3334
DRUG THERAPY
PHENOBARBITAL, 3397
HORMONES, 3371
ION TRANSPORT
CLEARANCE STUDY, 3398
SERUM
ALKALINE PHOSPHATASE, 3334
SEX FACTORS, 3371

CHOLESTEROL
BILE, 2819
CHENODEOXYCHOLIC ACID, 3391
DRUG EFFECTS ON, 3391
MENSTRUAL CYCLE, 2787*
SOLUBILITY, 2815
STEROLS, 3388
VAGOTOMY, 3393

CHOLESTEROL (continued)
CHOLELITHIASIS
DIETARY FACTORS, 3386
ETIOLOGY, 3383
ESTROGENS
DETERGENTS, 2797*
GALLSTONES
CHEMICAL PROPERTIES, 3383
GROWTH SUBSTANCES, 3384
MONOGLYCERIDES, 3387
SOLUBILITY, 3387
INTESTINAL ABSORPTION
DRUG EFFECTS ON, 2661*
JAUNDICE, OBSTRUCTIVE
METABOLISM, 3290
LIPIDS
CHENODEOXYCHOLIC ACID, 2790*
LIVER
DETERGENTS, 2797*
DRUGS, 2789*
METABOLISM, 2789*
SYNTHESIS, 3394
METABOLISM
DETERGENTS, 2825
DRUG EFFECTS ON, 2825
ESTROGENS, 2825
OBESITY
BILE, 3391
PORTACAVAL SHUNT
SYNTHESIS, 2831
SECRETION
CHOLELITHIASIS, 3394
DIETARY FACTORS, 2823
SOLUBILITY
BILE ACIDS AND SALTS, 2788*
SYNTHESIS
CHOLELITHIASIS, 3394

CHROMATIN
GASTRITIS, ATROPHIC, 3065

CHROMATOGRAPHY
BILE
LIPIDS, 2845
COLON
CARCINOEMBRYONIC ANTIGEN, 3042*
COLONIC DISEASES
CARCINOEMBRYONIC ANTIGEN, 3042*
FECES
STEROIDS, 2925
GASTRIN, 2931, 2932
STEROIDS
TECHNIQUES, 2925

CHYMOTRYPSIN
INTESTINES
PANCREATIC DISEASES, 3218

CIRCADIAN RHYTHM
ALKALINE PHOSPHATASE
FEEDING, 2872*
DISACCHARIDASES
FEEDING, 2872*
INTESTINE, SMALL
HYPERPLASIA, 2748
INTESTINES
ALKALINE PHOSPHATASE, 2872*
DISACCHARIDASES, 2872*
ENZYMES, 2872*
LACTASE, 2872*

CIRCADIAN RHYTHM (continued)
JEJUNUM
HYPERPLASIA, 2748
LACTASE
FEEDING, 2872*
SECRETION
GASTRIN, 2748
SERUM
GASTRIN, 2748

CIRCULATION
BILE
ADENOSINE CYCLIC 3',5'
MONOPHOSPHATE, 2817
BILE ACIDS AND SALTS, 2817
BILE ACIDS AND SALTS
KINETICS, 3336*
COLON, 2902*
ILEUM
DRUG EFFECTS ON, 2900*
VASOPRESSIN, 2900*
INTESTINE, SMALL, 2899*
DISTENTION, 2923
DRUG EFFECTS ON, 2900*
MUSCLES, 2897*
OBSTRUCTION, 2923
VASOPRESSIN, 2900*
VILLI, 2897*
INTESTINES
DIETARY FACTORS, 2880
LIVER, 2942
ALCOHOLISM, 2780*
ANESTHESIA, 3268
ANESTHETICS, 2941
ANGIOGRAPHY, 2941
BILE ACIDS AND SALTS, 2784*, 2785*,
3336*
CLEARANCE STUDY, 2943
DRUG EFFECTS ON, 2941
TRANSPLANTATION, 3295, 3297
LIVER DISEASES
SCANNING, SCINTILLATION, 3337*
MESENTERY
VASOPRESSIN, 2944

CIRRHOSIS
SEE LIVER CIRRHOSIS

CIRRHOSIS, BILIARY
SEE LIVER CIRRHOSIS, OBSTRUCTIVE

COLITIS
AMEBIASIS
COMPLICATIONS, 3460
PERFORATION, 3460
COMPLICATIONS
PERFORATION, 3460
DIAGNOSIS
ENDOSCOPY, 3000
DRUG-INDUCED
ANTIBIOTICS, 2904*, 2905*
TOXINS, 2905*
TRANSMISSION, 2904*

COLITIS, ULCERATIVE
BILE
LIPIDS, 3464*
COLON
CARBOHYDRATES, 3209
MORPHOLOGY, 3208

COLITIS, ULCERATIVE (continued)
COMPLICATIONS
MEGACOLON, 3207*
DIAGNOSIS
ALKALINE PHOSPHATASE, 2982
AMYLASES, 2982
FECES, 2982
DIARRHEA
DRUG THERAPY, 3405*
DISEASES ASSOCIATED WITH
CHOLELITHIASIS, 3464*
IMMUNOLOGY
ANTIGENS, 3206*
LIPIDS
METABOLISM, 3464*
MEGACOLON
SURGERY, 3207*
RADIOLOGY, 3210

COLLAGEN
ENZYMES
ALCOHOLISM, 3333
LIVER DISEASES, ALCOHOLIC, 3333
LIVER
ENZYMES, 3333
HISTOCHEMISTRY, 2642
IMMUNOLOGY, 2642
METABOLISM, 3333
SYNTHESIS, 2794*
LIVER CIRRHOSIS
SYNTHESIS, 2794*
METABOLISM
ALCOHOLISM, 3333
LIVER DISEASES, ALCOHOLIC, 3333

COLLAGEN DISEASES
ALCOHOLISM
DISEASES ASSOCIATED WITH, 3333
LIVER DISEASES, ALCOHOLIC
DISEASES ASSOCIATED WITH, 3333

COLON
SEE ALSO INTESTINE, LARGE
ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
DRUG EFFECTS ON, 2871*
BACTERIA
DIETARY FACTORS, 3179*
BILE ACIDS AND SALTS
DRUG EFFECTS ON, 2871*
BURNS, CHEMICAL, 3205
CARBOHYDRATES
COLITIS, ULCERATIVE, 3209
CARCINOEMBRYONIC ANTIGEN
CHROMATOGRAPHY, 3042*
IMMUNOLOGY, 3042*
CIRCULATION, 2902*
CROHN'S DISEASE
COMPLICATIONS, 3465*
DIVERTICULITIS, 3465*
ULCER, 3466*
DIVERTICULUM
SURGERY, 3196
THERAPY, 3196
ENDOSCOPY
SURGERY, 3002
TECHNIQUES, 3002
FATTY ACIDS
DRUG EFFECTS ON, 2871*

COLON (continued)
GLUCAGON
SYNTHESIS, 2884
HORMONES, GASTROINTESTINAL
SYNTHESIS, 2884
INTESTINAL OBSTRUCTION, 3192
INTUSSUSCEPTION
GEOGRAPHICAL FACTORS, 3193
MORPHOLOGY
COLITIS, ULCERATIVE, 3208
NEOPLASMS
HERNIA, 3201
INFLAMMATION, 3201
NEOPLASMS, MALIGNANT
BACTERIA, 2895*
CARCINOEMBRYONIC ANTIGEN, 3042*
DIAGNOSIS, 2953*, 2954*, 3042*
DIETARY FACTORS, 2891, 2895*
DRUG THERAPY, 3181*, 3182*
ETIOLOGY, 2891
FAMILIAL FACTORS, 3184*
GARDNER'S SYNDROME, 3197
OBSTRUCTION, 3192
POLYPS
DIAGNOSIS, 3186*
DUODENUM, 3187*
ENDOSCOPY, 3186*
FECES, 3186*
RADIOLOGY, 3186*
PRECANCEROUS CONDITIONS
DIAGNOSIS, 2953*
GARDNER'S SYNDROME, 2953*
RADIOLOGY
AMINO ACIDS, 2973
BARIUM, 3188*
TECHNIQUES, 2973, 2979
SECRETION
HORMONE EFFECTS ON, 2888
HORMONES, GASTROINTESTINAL, 2888
SOMATOSTATIN, 2888
SURGERY
ANTIBIOTICS, 3194
DIARRHEA, 3158
ULCER
ULTRASTRUCTURE, 2933

COLONIC DISEASES
CARCINOEMBRYONIC ANTIGEN
CHROMATOGRAPHY, 3042*
IMMUNOLOGY, 3042*
DIAGNOSIS
CARCINOEMBRYONIC ANTIGEN, 3042*
ENZYMES, 3042*
KIDNEYS
TRANSPLANTATION, 3180*

COMA
HEME
PORPHYRIA, 3260*

COMMON BILE DUCT
ENDOSCOPY
TECHNIQUES, 2695
MANOMETRY
TECHNIQUES, 2695
STRICTURE
DIAGNOSIS, 3366*
PATHOLOGY, 3366*

COMMON BILE DUCT (continued)
SURGERY
TECHNIQUES, 3369
WOUNDS AND INJURIES, 3161

COMMON BILE DUCT CALCULI
ENDOSCOPY
TECHNIQUES, 3376
THERAPY, 3358*
SHUNT, INTESTINAL
COMPLICATIONS, 3142*
THERAPY
ENDOSCOPY, 3376

COMPLEMENT
HEPATITIS, INFECTIOUS
PROGNOSIS, 3308

CONNECTIVE TISSUE
HEPATITIS, INFECTIOUS
DISEASES ASSOCIATED WITH, 3322

CONTRACEPTIVES
LIVER
NEOPLASMS, 3271

CONTRACEPTIVES, ORAL
CHOLELITHIASIS, 3371
CHOLESTASIS, 3371
INTESTINAL ABSORPTION
IRON, 2667
IRON
DEFICIENCY, 2667

CONTRAST MEDIA
CHOLECYSTOGRAPHY, 3015
GASTROINTESTINAL SYSTEM
MUCUS, 2921
INTESTINES
MUCUS, 2921
STOMACH
MUCUS, 2921
RADIOLOGY, 2967

CORTICOSTEROIDS
SEE HORMONES, ADRENAL CORTEX
ESOPHAGITIS
DRUG THERAPY, 3037

CRIGLER-NAJJAR SYNDROME
INFANT
DIAGNOSIS, 3299*
PHOTOTHERAPY, 3299*

CROHN'S DISEASE
COLON
COMPLICATIONS, 3465*
DIVERTICULITIS, 3465*
ULCER, 3466*
DIAGNOSIS, 3468
EPIDEMIOLOGY, 3469
ILEUM
MUCIN, 3462*
INTESTINE, SMALL
MUCIN, 3462*
PERMEABILITY, 3170*
SURGERY
PRECANCEROUS CONDITIONS, 3463*
THERAPY, 3468
PARENTERAL ALIMENTATION, 3467*

CRUVEILHIER-BAUMGARTEN SYNDROME
SEE LIVER CIRRHOSIS

CYCLIC ADENOSINE MONOPHOSPHATE
SEE ADENOSINE CYCLIC 3',5'
MONOPHOSPHATE

CYCLIC GUANOSINE MONOPHOSPHATE
SEE GUANOSINE CYCLIC 3',5'
MONOPHOSPHATE

CYSTIC FIBROSIS
PANCREAS
ALPHA FETOPROTEIN, 3213*
SERUM
ALPHA FETOPROTEIN, 3213*

CYSTS
INTESTINE, SMALL
COMPLICATIONS, 3152
INFLAMMATION, 3152
KIDNEYS
DIAGNOSIS, 3016
TOMOGRAPHY, 3016
ULTRASONOGRAPHY, 3016
LIVER
CARCINOGENS, 2799*
DIAGNOSIS, 3016, 3456*
DRUG-INDUCED, 2799*
DRUG THERAPY, 3456*
ECHINOCOCCOSIS, 3456*
REVIEW, 3256*
TOMOGRAPHY, 3016
ULTRASONOGRAPHY, 3016
ULTRASTRUCTURE, 2799*
MESENTERY
COMPLICATIONS, 3152
INFLAMMATION, 3152
SPLEEN
COMPLICATIONS, 3440

DEFECATION
SEE ALSO EXCRETION
LACTOSE INTOLERANCE
MILK, 3175

DEHYDROGENASES
SEE OXIDOREDUCTASES

DERMATITIS HERPETIFORMIS
IMMUNOLOGY, 3438
INTESTINE, SMALL
MORPHOLOGY, 3404*
INTESTINES
MORPHOLOGY, 3438
THERAPY
DIET, 3403*

DETERGENTS
BILE ACIDS AND SALTS
METABOLISM, 2825
CHOLESTEROL
ESTROGENS, 2797*
METABOLISM, 2825
LIVER
CHOLESTEROL, 2797*
LIPIDS, 2826
MEMBRANES, 2826
TRANSPORT
BILE ACIDS AND SALTS, 2826

DIABETES
BILE ACIDS AND SALTS
SYNTHESIS, 2829

DIAPHRAGM
ANOMALY
PANCREATITIS, 3436
HERNIA
CHILD, 3441
NEONATE, 3441

DIARRHEA
COLITIS, ULCERATIVE
DRUG THERAPY, 3405*
COLON
SURGERY, 3158
DIVERTICULITIS
DRUG THERAPY, 3405*
DRUG-INDUCED
DRUG THERAPY, 3407*
PROSTAGLANDINS, 3407*
DRUG THERAPY, 3159, 3406*
ANALYSIS, 3405*
ANTIDIARRHEALS, 3407*
ENTEROKINASE
DEFICIENCY, 3157
ETIOLOGY
ADENOSINE CYCLIC 3',5'
MONOPHOSPHATE, 2871*
BILE ACIDS AND SALTS, 2871*
FATTY ACIDS, 2871*
SURGERY, 3158
ILEUM
SURGERY, 3158, 3159
IRRITABLE COLON
DRUG THERAPY, 3405*
NUTRITION DISORDERS
PROGNOSIS, 3415
PROCTITIS
DRUG THERAPY, 3405*
SUCRASE
DEFICIENCY, 3157

DIET
CECUM
CARBOHYDRATES, 2901*
DERMATITIS HERPETIFORMIS
THERAPY, 3403*
FATTY LIVER
PREVENTION, 2835
THERAPY, 3332*
GASTROINTESTINAL DISEASES
FIBERS, 3431
PANCREATITIS, CHRONIC
THERAPY, 3247

DIGESTION
ANEMIA, PERNICIOUS, 3169*
COMPLICATIONS
DRUG THERAPY, 3426
ELECTROPHYSIOLOGY
GASTRIN, 2881
HORMONE EFFECTS ON, 2881
MALABSORPTION SYNDROMES
DISACCHARIDES, 3178
MONOSACCHARIDES, 3178
PANCREAS
PROTEINS, 2770

DIGESTION (continued)
PROTEINS
PANCREAS FUNCTION TESTS, 3224
PANCREATIC DISEASES, 3224
STOMACH
ANTACIDS, 3423
DRUG EFFECTS ON, 3423

DISACCHARIDASES
CIRCADIAN RHYTHM
FEEDING, 2872*
INTESTINES
CIRCADIAN RHYTHM, 2872*
FEEDING, 2872*
FETUS, 2872*

DISACCHARIDES
MALABSORPTION SYNDROMES
ABSORPTION, 3178
DIGESTION, 3178

DISTENTION
INTESTINE, SMALL
CIRCULATION, 2923
OXYGEN, 2923
INTESTINES
MOTILITY, 2704
STOMACH
ACID SECRETION, 2739
MOTILITY, 2681*

DIURETICS
PANCREATITIS
DRUG THERAPY, 3239

DIVERTICULITIS
COLON
CROHN'S DISEASE, 3465*
DIARRHEA
DRUG THERAPY, 3405*

DIVERTICULUM
COLON
SURGERY, 3196
THERAPY, 3196
DRUG THERAPY, 3426
DUODENUM
ENDOSCOPY, 3353*
ESOPHAGUS
ETIOLOGY, 3036
MOTILITY, 3035
SIGMOID
SURGERY, 3196
THERAPY, 3196
SURGERY
TECHNIQUES, 3196

DRUG-INDUCED
COLITIS
ANTIBIOTICS, 2904*, 2905*
TOXINS, 2905*
TRANSMISSION, 2904*
DIARRHEA
DRUG THERAPY, 3407*
PROSTAGLANDINS, 3407*
HEPATITIS, CHRONIC
IMMUNOSUPPRESSION, 3329*
ILEUM
MOTILITY, 2685, 2686

DRUG-INDUCED (continued)
INTESTINE, SMALL
MOTILITY, 2685, 2686
LIVER
CYSTS, 2799*
LIVER INJURY
BIOCHEMISTRY, 3302*
PATHOLOGY, 3302*
REVIEW, 3302*
SIMULATION, 2854
THERAPY, 3302*
RECTUM
GRANULOMA, 3190
STOMACH
ULCER, PEPTIC, 3054*
ULCER, PEPTIC
ANTINEOPLASTIC AGENTS, 3054*

DRUG METABOLISM
ALCOHOLISM
BREATH TEST, 2808
LIVER, 2802, 2838
ALCOHOLISM, 2808
CADMIUM, 2843
GENETIC FACTORS, 2807

DRUG THERAPY
ALCOHOLISM
LIVER CIRRHOSIS, 3348
CHOLELITHIASIS, 3383
BILE ACIDS AND SALTS, 3388, 3392
CHENODEOXYCHOLIC ACID, 3389, 3390
ENZYMES, 3425
PHOSPHOLIPIDS, 3382
STEROLS, 3388
CHOLESTASIS
PHENOBARBITAL, 3397
COLITIS, ULCERATIVE
DIARRHEA, 3405*
COLON
NEOPLASMS, MALIGNANT, 3181*, 3182*
DIARRHEA, 3159, 3406*
ANALYSIS, 3405*
ANTIDIARRHEALS, 3407*
DRUG-INDUCED, 3407*
DIGESTION
COMPLICATIONS, 3426
DIVERTICULITIS
DIARRHEA, 3405*
DIVERTICULUM, 3426
DUMPING SYNDROME
SECRETION, 3428
DUODENITIS
SECRETION, 3428
DUODENUM
ULCER, PEPTIC, 3078, 3098*, 3099*, 3101*, 3119, 3120, 3121, 3122, 3123, 3125, 3127, 3428
ESOPHAGEAL REFLUX
ESOPHAGITIS, 3022*
ESOPHAGITIS
CORTICOSTEROIDS, 3037
ESOPHAGEAL REFLUX, 3023*
ESOPHAGUS
HEMORRHAGE, 3040
REFLUX, 3034
FATTY LIVER
PROGNOSIS, 3332*

DRUG THERAPY (continued)
GASTRIN
PSYCHOLOGICAL FACTORS, 3424
GASTRITIS
HEMORRHAGE, 3040
GASTROINTESTINAL DISEASES
ANTACIDS, 3423
CHILD, 3423
GASTROINTESTINAL SYSTEM
HEMORRHAGE, 3040
HEPATITIS, 3324
HEPATITIS, CHRONIC, 3331
INTERFERON, 3330
HEPATITIS, INFECTIOUS, 3324
INTESTINES
AMEBIASIS, 3455*
IRRITABLE COLON
DIARRHEA, 3405*
LIVER
CYSTS, 3456*
ECHINOCOCCOSIS, 3456*
NEOPLASM METASTASIS, 3181*
NEOPLASMS, 3271
LIVER CIRRHOSIS
ASCITES, 3344
EDEMA, 3344
VITAMIN A, 3348
LIVER CIRRHOSIS, OBSTRUCTIVE, 3347
VITAMIN D, 3349
LIVER DISEASES, ALCOHOLIC, 3335
ENZYMES, 3425
LIVER CIRRHOSIS, 3348
NEOPLASMS, MALIGNANT
COMPLICATIONS, 3054*
PANCREATIC DISEASES
H2 RECEPTOR ANTAGONISTS, 3228*
PANCREATITIS, 3249
ANTIBIOTICS, 3239
ANTINEOPLASTIC AGENTS, 2751*
DIURETICS, 3239
THYROCALCITONIN, 2760
PANCREATITIS, CHRONIC, 3250
ENZYMES, 3425
SECRETION, 3428
PERITONITIS
TRYPSIN INHIBITORS, 3445
PROCTITIS
DIARRHEA, 3405*
RECTUM
NEOPLASMS, MALIGNANT, 3181*, 3182*, 3202
SHUNT, INTESTINAL
LIVER, 2865*
STOMACH
NEOPLASMS, 3090
ULCER, PEPTIC, 3051*, 3078, 3079, 3083, 3084
ULCER, PEPTIC, 3118, 3426
ANTACIDS, 3078, 3122
ENZYMES, 3425
H2 RECEPTOR ANTAGONISTS, 3078, 3083, 3084, 3099*, 3122, 3123, 3124, 3125
HEALING, 3051*, 3119, 3121
PAIN, 3119
PARASYMPATHOLYTICS, 3078
PROSTAGLANDINS, 3078
REVIEW, 3078
SECRETION, 3428

DRUG THERAPY (continued)
ZOLLINGER-ELLISON SYNDROME
H2 RECEPTOR ANTAGONISTS, 3412*

DUBIN-JOHNSON SYNDROME
SEE JAUNDICE, CHRONIC IDIOPATHIC

DUMPING SYNDROME
DRUG THERAPY
SECRETION, 3428

DUODENITIS
DRUG THERAPY
SECRETION, 3428

DUODENUM
SEE ALSO INTESTINE, SMALL
ABSORPTION
CALCIUM, 2874*
AFFERENT LOOP SYNDROME, 3155
ANEURYSM
DIAGNOSIS, 3227
ARTERIES
ANEURYSM, 3227
BLEEDING
LASER, 2922
THERAPY, 2922
COLON
POLYPS, 3187*
DIVERTICULUM
ENDOSCOPY, 3353*
ENDOSCOPY, 2983, 2985
ENZYMES
DEFICIENCY, 3149*
HEMORRHAGE
DIAGNOSIS, 2981
ENDOSCOPY, 2981
RADIOLOGY, 2981
IMMUNOLOGY
ULCER, PEPTIC, 3115
LIPASE, 2765
METAPLASIA
MORPHOLOGY, 2639*
MOTILITY
CERULEIN, 2677*
CHOLECYSTOKININ, 2677*
ELECTRICAL CONTROL, 2696, 2697, 2699
FEEDING, 2756
GLUCAGON, 2677*
HORMONE CONTROL, 2677*
HORMONE EFFECTS ON, 2677*
HORMONES, GASTROINTESTINAL, 2677*
MANOMETRY, 2697
MUSCLES
MORPHOLOGY, 2711
NERVOUS CONTROL, 2711
NEOPLASM METASTASIS
ENDOSCOPY, 2996
NEOPLASMS, MALIGNANT
ENDOSCOPY, 2996
OBSTRUCTION
ANGIOGRAPHY, 2980
DIAGNOSIS, 2980
RADIOLOGY, 2980
RADIOLOGY
TECHNIQUES, 2965

DUODENUM (continued)
STENOSIS
ANGIOGRAPHY, 2980
DIAGNOSIS, 2980
RADIOLOGY, 2980
SUCRASE
DEFICIENCY, 3149*
TRANSPORT
CALCIUM, 2874*
ULCER, PEPTIC, 3056*
ACID SECRETION, 3108
ANTACIDS, 3119, 3120, 3122, 3126
CALCIUM, 3126
DRUG THERAPY, 3078, 3098*, 3099*, 3101*, 3119, 3120, 3121, 3122, 3123, 3125, 3127, 3428
GASTRECTOMY, 3134
GASTRIN, 3125
H2 RECEPTOR ANTAGONISTS, 3122, 3123, 3125
MAGNESIUM, 3126
NITROGEN, 3110
SECRETION, 3428
VAGOTOMY, 3131
ULTRASTRUCTURE
ULCER, PEPTIC, 3099*
WOUNDS AND INJURIES, 3161

DYSKINESIA
SEE MOVEMENT DISORDERS

DYSPEPSIA
NITROGEN, 3110

DYSPLASIA
LYMPH
COMPLICATIONS, 3440

ECHINOCOCCOSIS
COMPLICATIONS
FISTULA, 3283
HEPATITIS, 3283
HERNIA, 3283
DIAGNOSIS
REVIEW, 3461
EPIDEMIOLOGY
REVIEW, 3461
LIVER
COMPLICATIONS, 3283
CYSTS, 3456*
DIAGNOSIS, 3282, 3284, 3456*
DRUG THERAPY, 3456*
EPIDEMIOLOGY, 3282
IMMUNOLOGY, 3456*
PROGNOSIS, 3283
SCANNING, SCINTILLATION, 3284
SURGERY, 3283
ULTRASONOGRAPHY, 3284, 3456*
THERAPY
REVIEW, 3461

ECHOGRAPHY
SEE ULTRASONOGRAPHY

EDEMA
LIVER
MORPHOLOGY, 2940
REGENERATION, 2940

EDEMA (continued)
LIVER CIRRHOSIS
ANTIBIOTICS, 3344
DRUG THERAPY, 3344
NUTRITION DISORDERS
PROGNOSIS, 3415

ELECTRICAL CONTROL
ANTRUM
MOTILITY, 2680*
DUODENUM
MOTILITY, 2696, 2697, 2699
INTESTINE, SMALL
MOTILITY, 2697, 2699
ODDI'S SPHINCTER
MOTILITY, 2696
STOMACH
MOTILITY, 2680*, 2683*, 2699

ELECTROPHORESIS
FECES
ISOENZYMES, 2982

ELECTROPHYSIOLOGY
DIGESTION
GASTRIN, 2881
HORMONE EFFECTS ON, 2881
ESOPHAGEAL REFLUX
DIAGNOSIS, 3025
ILEUM
ION TRANSPORT, 2672
MOTILITY, 2685
INTESTINE, SMALL
ION TRANSPORT, 2672
MOTILITY, 2675*
INTESTINES
PSEUDO-OBSTRUCTION, 3146*, 3147*
PANCREAS
DRUG EFFECTS ON, 2750*
PEPTIDES, 2750*
STOMACH
VAGOTOMY, 3061

ENDOCRINE SYSTEM
GASTROINTESTINAL SYSTEM
REVIEW, 3421

ENDOSCOPY
BILE DUCTS
COMPLICATIONS, 3353*
MANOMETRY, 3375
BILIARY TRACT, 2975
BILIARY TRACT DISEASES
COMPLICATIONS, 3353*
DIAGNOSIS, 2975
COLITIS
DIAGNOSIS, 3000
COLON
POLYPS, 3186*
SURGERY, 3002
TECHNIQUES, 3002
COMMON BILE DUCT
TECHNIQUES, 2695
COMMON BILE DUCT CALCULI
TECHNIQUES, 3376
THERAPY, 3358*, 3376
DUODENUM, 2983, 2985
DIVERTICULUM, 3353*
HEMORRHAGE, 2981
NEOPLASM METASTASIS, 2996

ENDOSCOPY (continued)
DUODENUM (continued)
NEOPLASMS, MALIGNANT, 2996
ESOPHAGEAL DISEASES
DIAGNOSIS, 2983, 2985
ESOPHAGUS, 2983, 2985
FISTULA, 2994
HEMORRHAGE, 2981
GASTRECTOMY
GASTRITIS, 3067
SURGERY, 3062
GASTROINTESTINAL DISEASES
DIAGNOSIS, 2966
GASTROINTESTINAL SYSTEM, 2983, 2985, 2991
HEMORRHAGE, 3448
HEMORRHAGE
LASER, 3453
RADIOLOGY, 3448
ILEITIS
DIAGNOSIS, 3000
INTESTINE, SMALL, 2991
INTESTINES
TUBERCULOSIS, 3000
JAUNDICE, OBSTRUCTIVE
DIAGNOSIS, 3400
LIVER, 2975
LIVER DISEASES
DIAGNOSIS, 2975
OCCUPATIONAL FACTORS, 2990
ODDI'S SPHINCTER
CHOLANGITIS, 3352*
CHOLECYSTITIS, 3352*
COMPLICATIONS, 3352*
HEMORRHAGE, 3352*
MANOMETRY, 3375
PANCREATITIS, 3352*
PANCREAS
COMPLICATIONS, 3353*
PANCREATOGRAPHY, 3009
PANCREATIC DISEASES
DIAGNOSIS, 3008
PANCREATITIS
DIAGNOSIS, 3009
PANCREATITIS, CHRONIC
PANCREATOGRAPHY, 3233
STOMACH, 2983, 2985, 2991
HEMORRHAGE, 2981
NEOPLASMS, 3076
NEOPLASMS, MALIGNANT, 2976, 2977, 3003, 3043*
ULCER, PEPTIC, 2955*
VARICES, 3076
STOMACH DISEASES
DIAGNOSIS, 2966, 2983, 2985
ULCER, PEPTIC
DIAGNOSIS, 2955*
VATER'S AMPULLA
COMPLICATIONS, 3353*
NEOPLASMS, 3376
NEOPLASMS, MALIGNANT, 3380
STENOSIS, 3376
TECHNIQUES, 3376

ENDOTOXINS
GLYCOGEN
METABOLISM, 2841
LIVER
GLYCOGENOLYSIS, 2841

ENEMA
BARIUM
TECHNIQUES, 2979

ENTERECTOMY
BILE
LIPIDS, 3464*
CALCIUM
BINDING, 2866*
DEFICIENCY, 3139*
COMPLICATIONS
BONES, 3139*
DISEASES ASSOCIATED WITH
CHOLELITHIASIS, 3464*
INTESTINE, SMALL
HYPERPLASIA, 2864*
PROGNOSIS, 3138*
PANCREAS
BICARBONATE SECRETION, 2777
SECRETION, 2777

ENTERITIS
BACTERIA, 2906*
ULTRASTRUCTURE, 2906*

ENTEROCOLITIS
INTESTINE, LARGE
ENZYMES, 3199
YERSINIA, 2896*

ENTEROCOLITIS, NECROTIZING
ETIOLOGY
HYPOXIA, 3409*
ISCHEMIA, 3409*

ENTEROKINASE
DIARRHEA
DEFICIENCY, 3157
INTESTINE, SMALL
DEFICIENCY, 3157
MALABSORPTION SYNDROMES
DEFICIENCY, 3157
NUTRITION DISORDERS
DEFICIENCY, 3157
PANCREATITIS
PREVENTION, 2775

ENTEROTOXINS
FEEDING
TECHNIQUES, 2920
ILEUM
GLYCOPROTEINS, 2892
INTESTINE, SMALL
GLYCOPROTEINS, 2892
LIVER INJURY
ANTIBIOTICS, 2853
CARBON TETRACHLORIDE, 2853

EOSINOPHILS
GASTROENTERITIS
CHILD, 3408*

ERYTHROCYTES
LIPIDS
PHYSICAL ACTIVITY, 2821

ESCHERICHIA COLI
BACTERIAL INFECTIONS
VACCINES, 2918

ESCHERICHIA COLI (continued)
INTESTINES
BACTERIAL INFECTIONS, 2918
VACCINES, 2918

ESOPHAGEAL DISEASES
DIAGNOSIS
ENDOSCOPY, 2983, 2985
RADIOLOGY, 2993
REVIEW, 2993
RADIOLOGY
REVIEW, 2993

ESOPHAGEAL REFLUX
ANOMALY, 3032
ANTRUM
MOTILITY, 3023*
COMPLICATIONS
PHARYNX, 3028
DIAGNOSIS, 2995
ACIDITY, 3020*
ELECTROPHYSIOLOGY, 3025
ION TRANSPORT, 3025
RADIOLOGY, 3032
ESOPHAGITIS
ANTACIDS, 3022*
DIAGNOSIS, 3033
DRUG THERAPY, 3022*, 3023*
FOOD, 3031
SURGERY, 3033
ESOPHAGUS
PRESSURE STUDY, 3027
PHARYNX
DIAGNOSIS, 3028
THERAPY, 3028
SCANNING, SCINTILLATION
TECHNIQUES, 3021*
THERAPY, 3021*
SLEEP, 3026
SPHINCTER, 3029
STOMACH
MOTILITY, 3023*
SURGERY
COMPLICATIONS, 3030
PRESSURE STUDY, 3024*
REVIEW, 3030
TECHNIQUES, 3030, 3058
THERAPY, 3024*

ESOPHAGITIS
ANTRUM
MOTILITY, 3023*
DRUG THERAPY
CORTICOSTEROIDS, 3037
ESOPHAGEAL REFLUX
ANTACIDS, 3022*
DIAGNOSIS, 3033
DRUG THERAPY, 3022*, 3023*
FOOD, 3031
SURGERY, 3033
IRRADIATION, 3037
MOTILITY
PROSTAGLANDINS, 3038
STOMACH
MOTILITY, 3023*

ESOPHAGUS
ACHALASIA
NERVOUS CONTROL, 3019*
ULTRASTRUCTURE, 3019*
DIVERTICULUM
ETIOLOGY, 3036
ENDOSCOPY, 2983, 2985
FISTULA
CHILD, 2994
DIAGNOSIS, 2994
ENDOSCOPY, 2994
INFANT, 2994
THERAPY, 2994
HEMORRHAGE, 3450
DIAGNOSIS, 2981, 3447, 3449
DRUG THERAPY, 3040
ENDOSCOPY, 2981
RADIOLOGY, 2981, 3447
THERAPY, 3447, 3449
VASOPRESSIN, 3040
MANOMETRY
TECHNIQUES, 2705
MOTILITY
DIVERTICULUM, 3035
MANOMETRY, 2705
NERVOUS CONTROL, 2673*
PROSTAGLANDINS, 3038
RADIOLOGY, 2993
REVIEW, 2993
TECHNIQUES, 2700
PERISTALSIS
TECHNIQUES, 2700
PRESSURE STUDY
ESOPHAGEAL REFLUX, 3027
REFLUX
ANTACIDS, 3034
DRUG THERAPY, 3034
THERAPY, 3034
SPHINCTER, 3029
MOTILITY, 2673*, 3038
NERVOUS CONTROL, 2673*
PRESSURE STUDY, 3027
VARICES
HEMORRHAGE, 3040

ESTROGENS
BILE ACIDS AND SALTS
METABOLISM, 2825
CHOLESTEROL
DETERGENTS, 2797*
METABOLISM, 2825
LIVER
LIPIDS, 2797*
LIVER INJURY, 2796*
SECRETION
BILE, 2826

EXCRETION
SEE ALSO DEFECATION
CHOLESTASIS
BILE ACIDS AND SALTS, 3359*
FATS
PYLOROPLASTY, 3104*

FASCIOLIASIS
AFLATOXINS
TOXICITY, 2919
BILE DUCTS
HYPERPLASIA, 2938

FATS
SEE ALSO LIPIDS, TRIGLYCERIDES
EXCRETION
PYLOROPLASTY, 3104*
FECES
PYLOROPLASTY, 3104*

FATTY ACIDS
COLON
DRUG EFFECTS ON, 2871*
DIARRHEA
ETIOLOGY, 2871*
INTESTINAL ABSORPTION
BILE ACIDS AND SALTS, 2656*
CARBOHYDRATES, 2657*
DRUG EFFECTS ON, 2661*
FOLIC ACID, 2657*
GLUCOSE, 2657*
LIVER
METABOLISM, 2833
METABOLISM
FETUS, 2833
PORTACAVAL SHUNT
SYNTHESIS, 2831
SERUM
ALCOHOLS, 2830
DRUG EFFECTS ON, 2830
TRACER STUDY, 2830

FATTY LIVER
DIET
THERAPY, 3332*
DRUG THERAPY
PROGNOSIS, 3332*
PREVENTION
ANTICHOLESTEROLEMICS, 2835
DIET, 2835
THERAPY
PROGNOSIS, 3332*

FECES
ALKALINE PHOSPHATASE
ISOENZYMES, 2982
AMMONIA
DIETARY FACTORS, 2891
AMYLASES
ISOENZYMES, 2982
BACTERIA
DIETARY FACTORS, 2894*, 2895*, 3179*
INFANT, 2894*
MILK, 2894*
NEONATE, 2894*
BILE ACIDS AND SALTS
ANTIBIOTICS, 3385
DRUG EFFECTS ON, 3385
BLEEDING
TECHNIQUES, 3001
COLITIS, ULCERATIVE
DIAGNOSIS, 2982
COLON
POLYPS, 3186*
DIETARY FACTORS
FIBERS, 2908*
FATS
PYLOROPLASTY, 3104*
INTESTINES
BACTERIAL INFECTIONS, 2949*

FECES (continued)
ISOENZYMES
ELECTROPHORESIS, 2982
MALABSORPTION SYNDROMES
BILE ACIDS AND SALTS, 2949*
PANCREATIC DISEASES
DIAGNOSIS, 2982
STEROIDS
CHROMATOGRAPHY, 2925
DIETARY FACTORS, 2908*
FIBERS, 2908*

FEEDING
ALKALINE PHOSPHATASE
CIRCADIAN RHYTHM, 2872*
ANTIGENS
IMMUNITY, 2912, 2913
LYMPHATIC SYSTEM, 2912, 2913
DISACCHARIDASES
CIRCADIAN RHYTHM, 2872*
DUODENUM
MOTILITY, 2756
ENTEROTOXINS
TECHNIQUES, 2920
INTESTINES
ALKALINE PHOSPHATASE, 2872*
DISACCHARIDASES, 2872*
ENZYMES, 2872*
LACTASE, 2872*
LACTASE
CIRCADIAN RHYTHM, 2872*
LIVER
GLUCOSE PHOSPHATE DEHYDROGENASE, 2834
PHOSPHOLIPIDS, 2834
LIVER DISEASES
BILE ACIDS AND SALTS, 2961*
PANCREAS
SECRETION, 2756
PANCREATIC DUCT
PRESSURE STUDY, 2756
REFLUX, 2756
SECRETIN, 2771, 3114

FERRITIN
LIVER
NEOPLASMS, MALIGNANT, 2839

FETOPROTEIN, ALPHA
SEE ALPHA FETOPROTEIN

FETUS
BILE ACIDS AND SALTS
METABOLISM, 2820
SYNTHESIS, 2812, 2822, 2824
FATTY ACIDS
METABOLISM, 2833
INTESTINE, SMALL
LYMPHOCYTES, 2635*
INTESTINES
ALKALINE PHOSPHATASE, 2872*
DISACCHARIDASES, 2872*
ENZYMES, 2872*
LACTASE, 2872*
LIPIDS
SYNTHESIS, 2833
LIVER
CYTOLOGY, 2646
MORPHOLOGY, 2646

FETUS (continued)
SECRETION
BILE ACIDS AND SALTS, 2824

FIBERS
FECES
DIETARY FACTORS, 2908*
STEROIDS, 2908*
GASTROINTESTINAL DISEASES
DIET, 3431
LIPIDS
DIETARY FACTORS, 2908*
LIPOPROTEINS
DIETARY FACTORS, 2908*
PLASMA
STEROLS, 2908*
STEROIDS
DIETARY FACTORS, 2908*
STEROLS
DIETARY FACTORS, 2908*

FIBRINOLYSIS
INTESTINE, SMALL
ANOMALY, 3163

FIBROSIS
LIVER
ENZYMES, 2855
ETIOLOGY, 2855

FISSURE
ANUS
ETIOLOGY, 3198
REVIEW, 3198

FISTULA
ECHINOCOCCOSIS
COMPLICATIONS, 3283
ESOPHAGUS
CHILD, 2994
DIAGNOSIS, 2994
ENDOSCOPY, 2994
INFANT, 2994
THERAPY, 2994
GASTROINTESTINAL SYSTEM
ARTERIES, 3039

FOLIC ACID
ENZYMES
ANTI-INFLAMMATORY AGENTS, 2662*
DRUG EFFECTS ON, 2662*
HEPATITIS
URINE, 3325
INTESTINAL ABSORPTION, 2664*
ANTI-INFLAMMATORY AGENTS, 2662*
BILE ACIDS AND SALTS, 2657*
DIETARY FACTORS, 2663*
DRUG EFFECTS ON, 2662*
FATTY ACIDS, 2657*
INTESTINES
TRANSPORT, 2662*
JEJUNUM
TRANSPORT, 2657*, 2664*
TRANSPORT
ANTI-INFLAMMATORY AGENTS, 2662*
DRUG EFFECTS ON, 2662*

FOOD
FSOPHAGEAL REFLUX
ESOPHAGITIS, 3031
HYPERSENSITIVITY, 3432

FUNGUS DISEASES
SEE MYCOSES

GALACTOSAMINE
HEPATITIS, TOXIC
PREVENTION, 2840
HEPATOCYTES
SECRETION, 2801*
ULTRASTRUCTURE, 2801*
LIVER
TOXICITY, 2840
LIVER INJURY
PREVENTION, 2840

GALACTOSE
INTESTINAL ABSORPTION, 2660*

GALLBLADDER
ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
BILE ACIDS AND SALTS, 2828
ANOMALY
RADIOLOGY, 3377
BILE ACIDS AND SALTS
TRANSPORT, 2828
MOTILITY
CHOLECYSTOKININ, 2684*, 2702
HORMONE CONTROL, 2684*, 2702
HORMONE EFFECTS ON, 2702
HORMONES, GASTROINTESTINAL, 2684*
NEOPLASMS
CLASSIFICATION, 3379
NEOPLASMS, BENIGN
ETIOLOGY, 3379
THERAPY, 3379
NEOPLASMS, MALIGNANT
ETIOLOGY, 3379
THERAPY, 3379
RADIOLOGY, 2969
TOMOGRAPHY, 2969
ULTRASONOGRAPHY, 2958*
ULTRASTRUCTURE
ORGAN CULTURE, 2640*

GALLBLADDER DISEASES
DIAGNOSIS
RADIOLOGY, 2969
TOMOGRAPHY, 2969
ULTRASONOGRAPHY, 2958*

GALLSTONES
SEE ALSO CHOLELITHIASIS
CHEMICAL COMPOSITION
REVIEW, 3355*
CHOLESTEROL
CHEMICAL PROPERTIES, 3383
GROWTH SUBSTANCES, 3384
MONOGLYCERIDES, 3387
SOLUBILITY, 3387
GROWTH SUBSTANCES
CALCIUM, 3384
PIGMENTS
GROWTH SUBSTANCES, 3384

GALLSTONES (continued)
SOLUBILITY
BILE ACIDS AND SALTS, 3392
CHENODEOXYCHOLIC ACID, 3389
MONOGLYCERIDES, 3387

GAMMA GLUTAMYLCYCLOTRANSFERASE
SEE ACYLTRANSFERASES

GARDNER'S SYNDROME
COLON
NEOPLASMS, MALIGNANT, 3197
PRECANCEROUS CONDITIONS, 2953*
COMPLICATIONS
NEOPLASMS, MALIGNANT, 3197
RECTUM
PRECANCEROUS CONDITIONS, 2953*

GASTRECTOMY
COMPLICATIONS
REFLUX, 3006
DUODENUM
ULCER, PEPTIC, 3134
GASTRITIS
ENDOSCOPY, 3067
HISTOLOGY, 3067
PATHOLOGY, 3067
INTESTINES
BACTERIA, 2893*
IRON
METABOLISM, 3135
RADIOLOGY, 3091
REFLUX
BILE, 3006
SURGERY
ENDOSCOPY, 3062
TECHNIQUES, 3091
ULCER, PEPTIC
TECHNIQUES, 3134

GASTRIC INHIBITORY POLYPEPTIDE
SEE HORMONES, GASTROINTESTINAL

GASTRIN
ABDOMEN
NERVOUS SYSTEM, 2712*
ALCOHOLISM
GASTRITIS, 3068
SERUM, 3068
ANTRUM
CELLS, 3095*
GASTRITIS, 3095*
MOTILITY, 2698
PARENTERAL ALIMENTATION, 2932
STRESS, 2932
SYNTHESIS, 2740, 2744
ULCER, PEPTIC, 3095*
CELLS
HYPERPLASIA, 3107
CHEMICAL PROPERTIES, 2931, 2932
CHROMATOGRAPHY, 2931, 2932
DIGESTION
ELECTROPHYSIOLOGY, 2881
DRUG EFFECTS ON
H2 RECEPTOR ANTAGONISTS, 3125
DRUG THERAPY
PSYCHOLOGICAL FACTORS, 3424
DUODENUM
ULCER, PEPTIC, 3125

GASTRIN (continued)
GASTRITIS
SERUM, 3067, 3068
GASTRITIS, ATROPHIC
SERUM, 3066
GASTROINTESTINAL SYSTEM, 2720*
H2 RECEPTOR ANTAGONISTS
SERUM, 3079
KINETICS, 2930
METABOLISM, 2909*
PARATHYROID GLANDS
MORPHOLOGY, 2727*
SECRETION
ANTIEMETICS, 3103*
CIRCADIAN RHYTHM, 2748
DRUG EFFECTS ON, 3103*
JEJUNUM, 2746
PARENTERAL ALIMENTATION, 2932
STARVATION, 2748
STRESS, 2932
ULCER, PEPTIC, 3103*
SERUM, 3066
ANTIEMETICS, 3103*
ANTRECTOMY, 3132
CIRCADIAN RHYTHM, 2748
DRUG EFFECTS ON, 3103*, 3125
H2 RECEPTOR ANTAGONISTS, 3125
HEMODIALYSIS, 3112
PARENTERAL ALIMENTATION, 2932
STARVATION, 2748
STRESS, 2932
ULCER, PEPTIC, 3103*
VAGOTOMY, 3132
STOMACH, 3066
ACID SECRETION, 3111
BINDING, 2731
CELLS, 2644
GASTRITIS, ATROPHIC, 3066
MOTILITY, 2698
SECRETION, 2735, 2746, 2748
SYNTHESIS, 2740, 2744
ULCER, PEPTIC, 2644
ULCER, PEPTIC
CELLS, 2644
SECRETION, 3053*
SERUM, 3125
ZOLLINGER-ELLISON SYNDROME
HORMONE EFFECTS ON, 3077

GASTRITIS
ALCOHOLISM
GASTRIN, 3068
ANTRUM
GASTRIN, 3095*
BILE
BILE ACIDS AND SALTS, 3048*
CELLS
INFLAMMATION, 3069, 3070
MITOSIS, 3071
MORPHOLOGY, 3069
DIAGNOSIS
ACID PHOSPHATASE, 2989
ALKALINE PHOSPHATASE, 2989
GASTRECTOMY
ENDOSCOPY, 3067
HISTOLOGY, 3067
PATHOLOGY, 3067
GASTRIN
SERUM, 3067

GASTRITIS (continued)
HEMORRHAGE
DRUG THERAPY, 3040
SURGERY, 3047*
THERAPY, 3047*
VASOPRESSIN, 3040
LYMPHOCYTES, 3070
REFLUX
BILE, 3048*
SERUM
GASTRIN, 3068
SURGERY
TECHNIQUES, 3047*

GASTRITIS, ATROPHIC
CARCINOEMBRYONIC ANTIGEN, 3064
CHROMATIN, 3065
GASTRIN
SERUM, 3066
STOMACH
GASTRIN, 3066
MOTILITY, 3005
PRECANCEROUS CONDITIONS, 3065

GASTRODUODENAL ULCER
SEE ULCER, PEPTIC

GASTROENTERITIS
DIAGNOSIS
ULTRASTRUCTURE, 2970
EOSINOPHILS
CHILD, 3408*
VIRUSES
ULTRASTRUCTURE, 2970

GASTROINTESTINAL DISEASES
CHILD
ANTACIDS, 3423
DRUG THERAPY, 3423
ETIOLOGY, 3439
COMPLICATIONS
AGE FACTORS, 3435
DIAGNOSIS
ENDOSCOPY, 2966
PANCREAS FUNCTION TESTS, 3220
REVIEW, 3422
DIET
FIBERS, 3431
DRUG THERAPY
ANTACIDS, 3423
ETIOLOGY
LYMPHATIC SYSTEM, 2928
LACTASE
DEFICIENCY, 3439
SURGERY
AGE FACTORS, 3435
COMPLICATIONS, 3435

GASTROINTESTINAL SYSTEM
ARTERIES
ANEURYSM, 3433
FISTULA, 3039
BLEEDING, 3039
DIAGNOSIS, 3001
LASER, 2922
THERAPY, 2922
CARCINOID TUMOR
THERAPY, 3164

GASTROINTESTINAL SYSTEM (continued)
CARDIOVASCULAR SYSTEM
DISEASE, 3437
CELLS
MITOSIS, 2910
REGENERATION, 2910
ENDOCRINE SYSTEM
REVIEW, 3421
ENDOSCOPY, 2983, 2985, 2991
GASTRIN, 2720*
HEMORRHAGE, 3450
ALCOHOLISM, 3225
CHILD, 3451
CLOTTING, 3453
DIAGNOSIS, 2981, 3448, 3449
DRUG THERAPY, 3040
ENDOSCOPY, 3448
INFANT, 3452
RADIOLOGY, 3447, 3448
THERAPY, 3449
VASOPRESSIN, 3040
HORMONES, GASTROINTESTINAL, 2719
MOTILITY
DRUG EFFECTS ON, 3427
TECHNIQUES, 2689
MUCUS
BARIUM, 2921
CONTRAST MEDIA, 2921
MUSCLES
DRUG EFFECTS ON, 3427
MOTILITY, 2674*
SPASM, 3427
NEOPLASMS, MALIGNANT
ALPHA FETOPROTEIN, 2984
ANTIGENS, 2984
DIAGNOSIS, 2984, 2992
PROSTAGLANDINS, 2629*
RADIOLOGY, 2991
REGENERATION
REVIEW, 2910
SECRETIN, 2720*
SURGERY
AGE FACTORS, 3435
COMPLICATIONS, 3435
PARENTERAL ALIMENTATION, 3429

GASTROSTOMY
COMPLICATIONS
RESPIRATORY SYSTEM, 3059

GIARDIASIS
CHILD
EPIDEMIOLOGY, 3457*
TRANSMISSION, 3457*
COMPLICATIONS, 3459*
EPIDEMIOLOGY, 3458*
INTESTINE, SMALL
BIOPSY, 3459*
MORPHOLOGY, 3459*
TRANSMISSION
WATER, 3458*
VILLI
ATROPHY, 3459*

GILBERT'S DISEASE
BILE
LIPIDS, 3301

GLUCAGON
COLON
SYNTHESIS, 2884
DUODENUM
MOTILITY, 2677*
ILEUM
SYNTHESIS, 2884

GLUCONEOGENESIS
LIVER
ALCOHOLISM, 2911

GLUCOSE
INTESTINAL ABSORPTION, 2660*, 2671
ALCOHOLISM, 2651*
ALCOHOLS, 2651*
BILE ACIDS AND SALTS, 2657*
CARBOHYDRATES, 2659*
DRUG EFFECTS ON, 2651*
FATTY ACIDS, 2657*
HEPARIN, 2670
PERITONITIS, 2670
INTESTINE, SMALL
HYDROLYSIS, 2671
TRANSPORT, 2657*, 2670, 2671
JEJUNUM
TRANSPORT, 2657*
PANCREATITIS
THERAPY, 3246
STOMACH
METABOLISM, 3057*
TRANSPORT
ALCOHOLISM, 2651*
ALCOHOLS, 2651*
DRUG EFFECTS ON, 2651*

GLUCOSE PHOSPHATE DEHYDROGENASE
HEPATITIS
DEFICIENCY, 3328
HEPATITIS, INFECTIOUS
DEFICIENCY, 3328
LIVER
DIETARY FACTORS, 2834
FEEDING, 2834

GLUCURONIDASE
STOMACH
NEOPLASMS, MALIGNANT, 3045*
ULCER, PEPTIC, 3045*

GLYCOGEN
LIVER
METABOLISM, 2841, 2842
METABOLISM
ENDOTOXINS, 2841

GLYCOGENOLYSIS
LIVER
ENDOTOXINS, 2841

GLYCOLYSIS
STOMACH
NEOPLASMS, MALIGNANT, 3057*
ULCER, PEPTIC, 3057*

GLYCOPROTEINS
ILEUM
ENTEROTOXINS, 2892

GLYCOPROTEINS (continued)
INTESTINE, SMALL
ENTEROTOXINS, 2892
PANCREAS
SECRETION, 2768

GRANULOMA
CELIAC DISEASE
DISEASES ASSOCIATED WITH, 3168*
LIVER
REVIEW, 3257*
RECTUM
DRUG-INDUCED, 3190

GROWTH SUBSTANCES
GALLSTONES
CALCIUM, 3384
CHOLESTEROL, 3384
PIGMENTS, 3384

GUANYL CYCLASE
STOMACH
DRUG EFFECTS ON, 2722*
HORMONE EFFECTS ON, 2722*

H2 RECEPTOR ANTAGONISTS
ACID SECRETION, 3079
DRUG EFFECTS ON, 2729, 3100*, 3124
REVIEW, 3124
DUODENUM
ULCER, PEPTIC, 3122, 3123, 3125
GASTRIN
DRUG EFFECTS ON, 3125
PANCREATIC DISEASES
DRUG THERAPY, 3228*
SERUM
GASTRIN, 3079, 3125
STOMACH
ACID SECRETION, 2729, 3122, 3124
ULCER, PEPTIC, 3079, 3083, 3084
ULCER, PEPTIC
DRUG THERAPY, 3078, 3083, 3084, 3099*, 3122, 3123, 3124, 3125
REVIEW, 3124
ZOLLINGER-ELLISON SYNDROME
DRUG THERAPY, 3412*

HEMATIN
SEE HEME

HEMATOBILIA
LIVER
BIOPSY, 3288

HEMATOMA
LIVER
WOUNDS AND INJURIES, 3273

HEME
LIVER
SYNTHESIS, 2844
PORPHYRIA
COMA, 3260*
HYPERTENSION, 3260*
PERFUSION, 3260*

HEMOBILIA
SEE HEMATOBILIA

HEMODIALYSIS
COMPLICATIONS
LIVER DISEASES, 3296
SERUM
GASTRIN, 3112
PEPSINOGEN, 3112

HEMOGLOBINS
SYNTHESIS
RADIONUCLIDES, 3419

HEMOLYSIS
HEPATITIS
COMPLICATIONS, 3328
HEPATITIS, INFECTIOUS
COMPLICATIONS, 3328

HEMORRHAGE
CLOTTING
LASER, 3453
DUODENUM
DIAGNOSIS, 2981
ENDOSCOPY, 2981
RADIOLOGY, 2981
ESOPHAGUS, 3450
DIAGNOSIS, 2981, 3447, 3449
DRUG THERAPY, 3040
ENDOSCOPY, 2981
RADIOLOGY, 2981, 3447
THERAPY, 3447, 3449
VARICES, 3040
VASOPRESSIN, 3040
GASTRITIS
DRUG THERAPY, 3040
SURGERY, 3047*
THERAPY, 3047*
VASOPRESSIN, 3040
GASTROINTESTINAL SYSTEM, 3450
ALCOHOLISM, 3225
CHILD, 3451
CLOTTING, 3453
DIAGNOSIS, 3448, 3449
DRUG THERAPY, 3040
ENDOSCOPY, 3448
INFANT, 3452
RADIOLOGY, 3448
THERAPY, 3449
VASOPRESSIN, 3040
INTESTINE, SMALL, 3450
DIAGNOSIS, 3447, 3449
NEUROFIBROMATOSIS, 3150
RADIOLOGY, 3447
THERAPY, 3447, 3449
JEJUNUM
NEUROFIBROMATOSIS, 3150
LASER
ENDOSCOPY, 3453
ODDI'S SPHINCTER
ENDOSCOPY, 3352*
PANCREAS
PSEUDOCYSTS, 3225
PANCREATITIS
SURGERY, 3251
THERAPY, 3251
RADIOLOGY
ENDOSCOPY, 3448

HEMORRHAGE (continued)
STOMACH, 3450
DIAGNOSIS, 2981, 3447, 3449
ENDOSCOPY, 2981
RADIOLOGY, 2981, 3447
THERAPY, 3447, 3449

HEPARIN
INTESTINAL ABSORPTION
GLUCOSE, 2670

HEPATECTOMY
INFECTION
PROGNOSIS, 3281
LIVER
INFECTION, 3281
TECHNIQUES, 3269

HEPATITIS
ANTIBODIES, 3326
BLOOD, 3326
COMPLICATIONS
HEMOLYSIS, 3328
HYPERBILIRUBINEMIA, 3328
DISEASES ASSOCIATED WITH
ALCOHOLISM, 3327
SYPHILIS, 3327
DRUG THERAPY, 3324
ECHINOCOCCOSIS
COMPLICATIONS, 3283
EPIDEMIOLOGY, 3311, 3312
GLUCOSE PHOSPHATE DEHYDROGENASE
DEFICIENCY, 3328
SERUM
AMINO TRANSFERASES, 3323
TRIGLYCERIDES, 3323
TRANSMISSION, 3311
TRIGLYCERIDES
AMINO TRANSFERASES, 3323
URINE
FOLIC ACID, 3325

HEPATITIS, CHRONIC
ANTIBODIES, 3317
PROGNOSIS, 3320
ANTIGENS
IMMUNOLOGY, 3316
PROGNOSIS, 3320
AUSTRALIA ANTIGEN
CARRIER STATE, 3320
IMMUNOLOGY, 3316
DRUG THERAPY, 3331
INTERFERON, 3330
IMMUNOSUPPRESSION
DRUG-INDUCED, 3329*
REVIEW, 3329*
IMMUNOTHERAPY, 3331
THERAPY
INTERFERON, 3330

HEPATITIS, CHRONIC INTERSTITIAL
SEE LIVER CIRRHOSIS

HEPATITIS, INFECTIOUS
AMINO TRANSFERASES
DENTISTRY, 3310
ANTIBODIES
DENTISTRY, 3310
PROGNOSIS, 3319

HEPATITIS, INFECTIOUS (continued)
ANTIGENS
IMMUNOLOGY, 3316
PROGNOSIS, 3319
AUSTRALIA ANTIGEN
ANTIBODIES, 3315
DENTISTRY, 3310
EPIDEMIOLOGY, 3309
IMMUNOLOGY, 3316, 3321
PROGNOSIS, 3319
CARRIER STATE
ANTIBODIES, 3317
COMPLEMENT
PROGNOSIS, 3308
COMPLICATIONS
HEMOLYSIS, 3328
HYPERBILIRUBINEMIA, 3328
DISEASES ASSOCIATED WITH
ALCOHOLISM, 3327
CONNECTIVE TISSUE, 3322
SYPHILIS, 3327
DRUG EFFECTS ON
ALCOHOLS, 2856
DRUG THERAPY, 3324
EPIDEMIOLOGY, 3311
ETHNIC FACTORS, 3307*
GLUCOSE PHOSPHATE DEHYDROGENASE
DEFICIENCY, 3328
HEPATOCYTES
TOXICITY, 3321
SERUM
AMINO TRANSFERASES, 3323
TRIGLYCERIDES, 3323
TRANSMISSION, 3311
FAMILIAL FACTORS, 3312
TRIGLYCERIDES
AMINO TRANSFERASES, 3323
VACCINES
REVIEW, 3306*

HEPATITIS, SERUM
ANTIBODIES, 3326
BLOOD, 3326

HEPATITIS, TOXIC
DIAGNOSIS, 3305
GALACTOSAMINE
PREVENTION, 2840
PREVENTION, 3305
ANTIOXIDANTS, 2840

HEPATITIS, VIRAL
SEE HEPATITIS, INFECTIOUS

HEPATOCYTES
ATROPHY
STARVATION, 2859
AUSTRALIA ANTIGEN
TECHNIQUES, 3314
DRUG EFFECTS ON
ANTINEOPLASTIC AGENTS, 3261*
GALACTOSAMINE
SECRETION, 2801*
ULTRASTRUCTURE, 2801*
HEPATITIS, INFECTIOUS
TOXICITY, 3321
IMMUNOGLOBULINS, 2935
LIPIDS
STARVATION, 2859

HEPATOCYTES (continued)
MEMBRANES
BIOCHEMISTRY, 2645
MITOCHONDRIA
OBESITY, 3143*
MORPHOLOGY
ANTINEOPLASTIC AGENTS, 3261*
DRUG EFFECTS ON, 3261*
TRANSPORT
AMINO ACIDS, 2783*
ULTRASTRUCTURE
ANTINEOPLASTIC AGENTS, 3261*
DRUG EFFECTS ON, 3261*
STARVATION, 2859

HEPATOLENTICULAR DEGENERATION
SEE WILSON'S DISEASE

HERNIA
COLON
NEOPLASMS, 3201
DIAPHRAGM
CHILD, 3441
NEONATE, 3441
ECHINOCOCCOSIS
COMPLICATIONS, 3283
INTESTINAL OBSTRUCTION, 3153
INTESTINE, SMALL
PERFORATION, 3151
SIGMOID
NEOPLASMS, 3201

HERNIA, HIATUS
SEE HIATAL HERNIA

HERPESVIRUSES
LIVER
CALCIFICATION, 3018

HIATAL HERNIA
DIAGNOSIS, 2995
SURGERY
TECHNIQUES, 3041

HISTAMINE
PYLORUS
MOTILITY, 2690
STOMACH
ACID SECRETION, 2734
MOTILITY, 2690

HORMONE CONTROL
ANTRUM
MOTILITY, 2698
DUODENUM
MOTILITY, 2677*
GALLBLADDER
MOTILITY, 2684*, 2702
INTESTINE, SMALL
MOTILITY, 2643, 2676*, 2677*
INTESTINES
MOTILITY, 2643
ODDI'S SPHINCTER
MOTILITY, 2692
STOMACH
MOTILITY, 2698
TRANSPORT
BILE ACIDS AND SALTS, 2850
SULFOBROMOPHTHALEIN, 2850

HORMONES
CHOLELITHIASIS, 3371
CHOLESTASIS, 3371

HORMONES, ADRENAL CORTEX
LIVER CIRRHOSIS
ASCITES, 3342
STOMACH
DRUG EFFECTS ON, 2743
HORMONE EFFECTS ON, 2743

HORMONES, GASTROINTESTINAL
COLON
SECRETION, 2888
SYNTHESIS, 2884
DUODENUM
MOTILITY, 2677*
GALLBLADDER
MOTILITY, 2684*
GASTROINTESTINAL SYSTEM, 2719
ILEUM
SYNTHESIS, 2884
INTESTINE, SMALL
ADENYL CYCLASE, 2873*
CELLS, 2636*
MOTILITY, 2677*
NERVOUS SYSTEM, 2643
ULTRASTRUCTURE, 2636*
INTESTINES
NERVOUS SYSTEM, 2643
KINETICS, 2930
SECRETION
PEPSIN, 2738
SHORT BOWEL SYNDROME, 2863*

HYPERAMYLASEMIA
PANCREATITIS, CHRONIC
ISOZYMES, 3232*

HYPERBILIRUBINEMIA
DIAGNOSIS, 3372
HEPATITIS
COMPLICATIONS, 3328
HEPATITIS, INFECTIOUS
COMPLICATIONS, 3328

HYPERBILIRUBINEMIA, HEREDITARY
SEE ALSO CRIGLER-NAJJAR SYNDROME

HYPERCHLORHYDRIA
STOMACH
ZOLLINGER-ELLISON SYNDROME, 3446
ULCER, PEPTIC, 3107

HYPERLIPEMIA
SHUNT, INTESTINAL
COMPLICATIONS, 3154

HYPERLIPEMIC AGENTS
LIVER
DRUG EFFECTS ON, 2836

HYPERLIPOPROTEINEMIA
BILE ACIDS AND SALTS
SYNTHESIS, 3258*

HYPERPLASIA
BILE DUCTS
FASCIOLIASIS, 2938

HYPERPLASIA (continued)
GASTRIN
CELLS, 3107
INTESTINE, SMALL
CIRCADIAN RHYTHM, 2748
ENTERECTOMY, 2864*
SHUNT, INTESTINAL, 2864*
STARVATION, 2748
SURGERY, 2864*
JEJUNUM
CIRCADIAN RHYTHM, 2748
STARVATION, 2748
SALIVARY GLANDS, 2717
STOMACH
ULCER, PEPTIC, 2644

HYPERSENSITIVITY
FOOD, 3432
STOMACH DISEASES
ANTIBODIES, 3089

HYPERTENSION
HEME
PORPHYRIA, 3260*

HYPERTENSION, PORTAL
ETIOLOGY, 3343
IMMUNOGLOBULINS, 2936
PRESSURE STUDY
TECHNIQUES, 3340
SERUM
IMMUNOGLOBULINS, 2857
THERAPY
SPLENECTOMY, 3343

HYPERTROPHY
PYLORUS
STENOSIS, 3073

HYPOCHOLESTEROLEMIA
LIVER
LIPIDS, 2797*

HYPOTHERMIA
PANCREATITIS
THERAPY, 3240, 3244, 3245
STOMACH
PANCREATITIS, 3244

HYPOXIA
ENTEROCOLITIS, NECROTIZING
ETIOLOGY, 3409*
LIVER
METABOLISM, 3266
PATHOLOGY, 3266

ICTERUS
SEE JAUNDICE

ILEITIS
BILE
LIPIDS, 3464*
DIAGNOSIS
ENDOSCOPY, 3000
DISEASES ASSOCIATED WITH
CHOLELITHIASIS, 3464*
ULTRASTRUCTURE, 2926

ILEOSTOMY
COMPLICATIONS
MALABSORPTION SYNDROMES, 3148*

ILEUM
SEE ALSO INTESTINE, SMALL
ANOMALY, 3160
ANOMALY, CONGENITAL
ATRESIA, 3162
CIRCULATION
DRUG EFFECTS ON, 2900*
VASOPRESSIN, 2900*
ENZYMES, 2876*
GLUCAGON
SYNTHESIS, 2884
GLYCOPROTEINS
ENTEROTOXINS, 2892
HORMONES, GASTROINTESTINAL
SYNTHESIS, 2884
INTESTINE, SMALL
SECRETION, 2637*
ION TRANSPORT
CALCIUM, 2685
ELECTROPHYSIOLOGY, 2672
POTASSIUM, 2685
SODIUM, 2672
ISOLATION
MORPHOLOGY, 3145*
ULTRASTRUCTURE, 3145*
MORPHOLOGY, 2637*
MOTILITY
ATROPINE, 2686
DRUG EFFECTS ON, 2678*, 2686
DRUG-INDUCED, 2685, 2686
ELECTROPHYSIOLOGY, 2685
ION TRANSPORT, 2685, 2686
TECHNIQUES, 2710
MUCIN
CROHN'S DISEASE, 3462*
MYCOSES, 3203
POLYPS
DIAGNOSIS, 3166
RADIOLOGY, 3166
STEROLS
SYNTHESIS, 2876*
SURGERY
DIARRHEA, 3158, 3159
TRANSPORT
VITAMIN C, 2653*
ULTRASTRUCTURE, 2637*

ILEUS
SEE INTESTINAL OBSTRUCTION

IMMUNITY
ANTIGENS
FEEDING, 2912, 2913
INTESTINES
ANTIGENS, 2912, 2913
PARASITES AND PARASITIC DISEASES, 2917

IMMUNOGLOBULINS
ALCOHOLISM, 2936
CELIAC DISEASE, 3171*
HEPATOCYTES, 2935
HYPERTENSION, PORTAL, 2936
LIVER DISEASES, ALCOHOLIC, 2936
SERUM
ALCOHOLISM, 2857
HYPERTENSION, PORTAL, 2857

IMMUNOSUPPRESSION
HEPATITIS, CHRONIC
DRUG-INDUCED, 3329*
REVIEW, 3329*

IMMUNOTHERAPY
HEPATITIS, CHRONIC, 3331

INFANT
CRIGLER-NAJJAR SYNDROME
DIAGNOSIS, 3299*
PHOTOTHERAPY, 3299*
ESOPHAGUS
FISTULA, 2994
FECES
BACTERIA, 2894*
GASTROINTESTINAL SYSTEM
HEMORRHAGE, 3452
INTESTINES
BACTERIA, 2894*
PLASMA
MOTILIN, 2914
PYLORUS
STENOSIS, 3073
SECRETION
MOTILIN, 2914
ULCER, PEPTIC
ETIOLOGY, 3096*

INFARCTION
ANGIOGRAPHY
COMPLICATIONS, 3140*
INTESTINE, SMALL, 3140*

INFECTION
HEPATECTOMY
PROGNOSIS, 3281
LIVER, 3280
CALCIFICATION, 3018
HEPATECTOMY, 3281
PROGNOSIS, 3281
SURGERY, 3281

INFECTION, BACTERIA
SEE BACTERIAL INFECTIONS

INFECTION, FUNGUS
SEE MYCOSES

INFECTION, VIRUS
SEE VIRUS DISEASES

INFLAMMATION
BILE DUCTS
REVIEW, 2648
COLON
NEOPLASMS, 3201
GASTRITIS
CELLS, 3069, 3070
INTESTINE, SMALL
CYSTS, 3152
MESENTERY
CYSTS, 3152
ODDI'S SPHINCTER
DIAGNOSIS, 3362*
THERAPY, 3362*
SIGMOID
NEOPLASMS, 3201

INFLAMMATORY BOWEL DISEASES
ANTIBODIES, 3211
BILE
LIPIDS, 3464*

INFLAMMATORY BOWEL DISEASES (continued)
DIAGNOSIS
RADIOLOGY, 3188*
DISEASES ASSOCIATED WITH
CHOLELITHIASIS, 3464*
ETIOLOGY
VIRUSES, 3211
LIPIDS
METABOLISM, 3464*
NUCLEIC ACIDS, 3211
REVIEW, 3174
SIMULATION, 2903*
SURGERY
TECHNIQUES, 3200

INSULIN
STOMACH
ACID SECRETION, 3004
ULCER, PEPTIC
PROGNOSIS, 3004

INTERFERON
HEPATITIS, CHRONIC
DRUG THERAPY, 3330
THERAPY, 3330

INTESTINAL ABSORPTION
AMINO ACIDS, 2652*
ALCOHOLISM, 2651*
ALCOHOLS, 2651*
BACTERIAL INFECTIONS, 2665*
BILE ACIDS AND SALTS, 2657*
DRUG EFFECTS ON, 2651*
ANEMIA, PERNICIOUS, 3169*
BILE ACIDS AND SALTS
PHOSPHOLIPIDS, 2654*
CALCIUM, 2666
AMINO ACIDS, 2874*
CARBOHYDRATES
BILE ACIDS AND SALTS, 2657*
FATTY ACIDS, 2657*
GLUCOSE, 2659*
CHOLESTEROL
DRUG EFFECTS ON, 2661*
FATTY ACIDS
BILE ACIDS AND SALTS, 2656*
DRUG EFFECTS ON, 2661*
FOLIC ACID, 2664*
ANTI-INFLAMMATORY AGENTS, 2662*
BILE ACIDS AND SALTS, 2657*
DIETARY FACTORS, 2663*
DRUG EFFECTS ON, 2662*
FATTY ACIDS, 2657*
GALACTOSE, 2660*
GLUCOSE, 2660*, 2671
ALCOHOLISM, 2651*
ALCOHOLS, 2651*
BILE ACIDS AND SALTS, 2657*
DRUG EFFECTS ON, 2651*
FATTY ACIDS, 2657*
HEPARIN, 2670
PERITONITIS, 2670
IRON
CONTRACEPTIVES, ORAL, 2667
DEFICIENCY, 2667, 2669
DRUG EFFECTS ON, 2667
LIPIDS
ENZYMES, 2875*
ULTRASTRUCTURE, 2655*

INTESTINAL ABSORPTION (continued)
MACROMOLECULES
ALCOHOLISM, 2650*
TECHNIQUES, 3167*
VITAMIN B12, 2634*
PANCREATIC DISEASES, 2724*
PEPTIDE HYDROLASES, 2724*
VITAMIN C, 2653*
XYLOSE, 2660*
ALCOHOLISM, 2668
BILE ACIDS AND SALTS, 2657*

INTESTINAL OBSTRUCTION
BLOOD
SEROTONIN, 2879*
CHOLELITHIASIS
COMPLICATIONS, 3116
COLON, 3192
COMPLICATIONS
ULCER, 3116
DIAGNOSIS, 2978
ANGIOGRAPHY, 2980
HERNIA, 3153
INTESTINE, SMALL
GROWTH FACTORS, 2898*
MITOSIS, 2898*
MORPHOLOGY, 2898*
INTESTINES
MOTILITY, 2704
SECRETION, 2898*
VAGOTOMY
COMPLICATIONS, 3192

INTESTINE, LARGE
SEE ALSO CECUM, COLON
ENZYMES
ENTEROCOLITIS, 3199
HISTOCHEMISTRY
TECHNIQUES, 2952*
INTUSSUSCEPTION
GEOGRAPHICAL FACTORS, 3193
NEOPLASMS, MALIGNANT
DIAGNOSIS, 2952*
HISTOCHEMISTRY, 2952*

INTESTINE, SMALL
SEE ALSO DUODENUM, ILEUM, JEJUNUM
ABSORPTION
IRON, 2890
LIPIDS, 2655*
ADENYL CYCLASE
HORMONE EFFECTS ON, 2873*
HORMONES, GASTROINTESTINAL, 2873*
ANGIOGRAPHY
COMPLICATIONS, 3140*
INFARCTION, 3140*
ANOMALY, 3160
ANOMALY, CONGENITAL
ATRESIA, 3162
BACTERIAL INFECTIONS
VITAMIN B12, 3137*
BIOPSY
GIARDIASIS, 3459*
TECHNIQUES, 2951*
CALCIUM
BINDING, 2866*
CARCINOEMBRYONIC ANTIGEN
MORPHOLOGY, 2633*
ULTRASTRUCTURE, 2633*

INTESTINE, SMALL (continued)
CELIAC DISEASE
PERMEABILITY, 3170*
CIRCULATION, 2899*
DISTENTION, 2923
DRUG EFFECTS ON, 2900*
OBSTRUCTION, 2923
VASOPRESSIN, 2900*
CROHN'S DISEASE
PERMEABILITY, 3170*
CYSTS
COMPLICATIONS, 3152
INFLAMMATION, 3152
DRUG EFFECTS ON
ANTIBIOTICS, 2869*
ENDOSCOPY, 2991
ENTERECTOMY
PROGNOSIS, 3138*
ENTEROKINASE
DEFICIENCY, 3157
ENZYMES, 2876*
DEFICIENCY, 3149*
FIBRINOLYSIS
ANOMALY, 3163
GLUCOSE
HYDROLYSIS, 2671
GLYCOPROTEINS
ENTEROTOXINS, 2892
GROWTH FACTORS
INTESTINAL OBSTRUCTION, 2898*
HEMORRHAGE, 3450
DIAGNOSIS, 3447, 3449
NEUROFIBROMATOSIS, 3150
RADIOLOGY, 3447
THERAPY, 3447, 3449
HERNIA
PERFORATION, 3151
HORMONES, GASTROINTESTINAL
CELLS, 2636*
ULTRASTRUCTURE, 2636*
HYPERPLASIA
CIRCADIAN RHYTHM, 2748
ENTERECTOMY, 2864*
SHUNT, INTESTINAL, 2864*
STARVATION, 2748
SURGERY, 2864*
ILEUM
SECRETION, 2637*
INTRINSIC FACTOR
BINDING, 2634*
ION TRANSPORT
ALCOHOLISM, 2651*
ALCOHOLS, 2651*
CALCIUM, 2666, 2685
DRUG EFFECTS ON, 2651*
ELECTROPHYSIOLOGY, 2672
POTASSIUM, 2685
SODIUM, 2672
IRON
BINDING, 2890
ISCHEMIA, 3163
ISOLATION
MORPHOLOGY, 3145*
ULTRASTRUCTURE, 3145*
LIPASE, 2765
LIPIDS
ENZYMES, 2875*
LYMPHOCYTES
FETUS, 2635*

INTESTINE, SMALL (continued)
LYMPHOMA
DIAGNOSIS, 3141*
METAPLASIA, 3056*
MITOSIS, 2951*
INTESTINAL OBSTRUCTION, 2898*
MORPHOLOGY, 2637*
ANTIBIOTICS, 2869*
DERMATITIS HERPETIFORMIS, 3404*
DRUG EFFECTS ON, 2869*
GIARDIASIS, 3459*
HYPOTHYROIDISM, 2631*
INTESTINAL OBSTRUCTION, 2898*
MORPHOMETRY
TECHNIQUES, 2951*
MOTILITY
ATROPINE, 2686
CERULEIN, 2677*
DRUG EFFECTS ON, 2678*, 2686
DRUG-INDUCED, 2685, 2686
ELECTRICAL CONTROL, 2697, 2699
ELECTROPHYSIOLOGY, 2675*, 2685
HORMONE CONTROL, 2643, 2676*, 2677*
HORMONE EFFECTS ON, 2677*
HORMONES, GASTROINTESTINAL, 2677*
ION TRANSPORT, 2685, 2686
MANOMETRY, 2697
MUSCLES, 2675*
NERVOUS CONTROL, 2643, 2676*
MUCIN
CROHN'S DISEASE, 3462*
MUSCLES
CIRCULATION, 2897*
NEOPLASM METASTASIS
COMPLICATIONS, 3165
PERFORATION, 3165
NERVOUS CONTROL
DRUG EFFECTS ON, 2632*
NERVOUS SYSTEM
DRUG EFFECTS ON, 2632*
HORMONES, GASTROINTESTINAL, 2643
ULTRASTRUCTURE, 2632*
OBSTRUCTION, 3160
ANGIOGRAPHY, 2980
DIAGNOSIS, 2978, 2980
RADIOLOGY, 2980
OXYGEN
DISTENTION, 2923
OBSTRUCTION, 2923
PROTEINS
NEONATE, 2877*
PANCREATIC DISEASES, 2769
PURINES
METABOLISM, 2870*
RADIOLOGY, 2991
SECRETION, 2882
ADENYL CYCLASE, 2873*
ANTIBODIES, 2883
CELLS, 2637*, 2883
HORMONE EFFECTS ON, 2873*
IMMUNOLOGY, 2883
MUCUS, 2883
PRESSURE STUDY, 2867*
STEROLS
SYNTHESIS, 2876*
SUCRASE
DEFICIENCY, 3149*, 3157

INTESTINE, SMALL (continued)
SURGERY
ABSORPTION, 3156
MITOSIS, 3156
MORPHOLOGY, 3156
TOXICITY
ALCOHOLS, 2886
TRANSPORT
AMINO ACIDS, 2651*, 2652*, 2657*
FOLIC ACID, 2657*
GLUCOSE, 2657*, 2670, 2671
LIPIDS, 2655*
MEMBRANES, 2649*
OXYGEN, 2899*
VITAMIN C, 2653*
XYLOSE, 2657*
ULTRASTRUCTURE, 2637*
ALCOHOLISM, 2630*
DRUG EFFECTS ON, 2632*
HYPOTHYROIDISM, 2631*
VILLI
CIRCULATION, 2897*
VITAMIN B12
BINDING, 2634*
METABOLISM, 3137*
WOUNDS AND INJURIES, 3161
PERFORATION, 3151

INTESTINES
ABSORPTION
VITAMIN D, 3350
XYLOSE, 2999
ALKALINE PHOSPHATASE
CIRCADIAN RHYTHM, 2872*
FEEDING, 2872*
FETUS, 2872*
AMEBIASIS
DRUG THERAPY, 3455*
ANTIGENS
IMMUNITY, 2912, 2913
LYMPHATIC SYSTEM, 2912, 2913
BACTERIA, 2924
DIETARY FACTORS, 2894*
GASTRECTOMY, 2893*
INFANT, 2894*
MILK, 2894*
NEONATE, 2894*
VAGOTOMY, 2893*
BACTERIAL INFECTIONS
BREATH TEST, 2949*
DIAGNOSIS, 2949*
ESCHERICHIA COLI, 2918
FECES, 2949*
VACCINES, 2918
CHYMOTRYPSIN
PANCREATIC DISEASES, 3218
CIRCULATION
DIETARY FACTORS, 2880
DERMATITIS HERPETIFORMIS
MORPHOLOGY, 3438
DISACCHARIDASES
CIRCADIAN RHYTHM, 2872*
FEEDING, 2872*
FETUS, 2872*
EMBRYOLOGY
NUTRITION DISORDERS, 2927
ENZYMES
CIRCADIAN RHYTHM, 2872*
FEEDING, 2872*
FETUS, 2872*

INTESTINES (continued)
ESCHERICHIA COLI
VACCINES, 2918
LACTASE
CIRCADIAN RHYTHM, 2872*
FEEDING, 2872*
FETUS, 2872*
MOTILITY
DISTENTION, 2704
DRUG EFFECTS ON, 2688
HORMONE CONTROL, 2643
INTESTINAL OBSTRUCTION, 2704
NERVOUS CONTROL, 2643
MUCUS
BARIUM, 2921
CONTRAST MEDIA, 2921
NERVOUS SYSTEM
HORMONES, GASTROINTESTINAL, 2643
PHAGOCYTOSIS
CELLS, 2868*
PSEUDO-OBSTRUCTION
ELECTROPHYSIOLOGY, 3146*, 3147*
MOTILITY, 3146*, 3147*
TRANSPORT
FOLIC ACID, 2662*
TUBERCULOSIS
DIAGNOSIS, 3000, 3189*
ENDOSCOPY, 3000
VITAMIN D
BINDING, 2878*

INTRINSIC FACTOR
INTESTINE, SMALL
BINDING, 2634*
SECRETION
VAGOTOMY, 3105*
STOMACH
SECRETION, 3105*
VAGOTOMY, 3105*
VITAMIN B12
BINDING, 2634*, 2724*

INTUSSUSCEPTION
CECUM
GEOGRAPHICAL FACTORS, 3193
COLON
GEOGRAPHICAL FACTORS, 3193
INTESTINE, LARGE
GEOGRAPHICAL FACTORS, 3193

ION TRANSPORT
CALCIUM
CHOLECYSTOKININ, 2658*
DRUG EFFECTS ON, 2658*
HORMONE EFFECTS ON, 2658*
CHOLESTASIS
CLEARANCE STUDY, 3398
ESOPHAGEAL REFLUX
DIAGNOSIS, 3025
ILEUM
CALCIUM, 2685
ELECTROPHYSIOLOGY, 2672
MOTILITY, 2685, 2686
POTASSIUM, 2685
SODIUM, 2672
INTESTINE, SMALL
ALCOHOLISM, 2651*
ALCOHOLS, 2651*
CALCIUM, 2666, 2685

ION TRANSPORT (continued)
INTESTINE, SMALL (continued)
DRUG EFFECTS ON, 2651*
ELECTROPHYSIOLOGY, 2672
MOTILITY, 2685, 2686
POTASSIUM, 2685
SODIUM, 2672
PANCREAS, 2749*
CALCIUM, 2658*
RECTUM
MOTILITY, 2687
STOMACH
ACID SECRETION, 2728, 2730
BILE ACIDS AND SALTS, 2723*
CALCIUM, 2707
CHENODEOXYCHOLIC ACID, 2723*
DRUG EFFECTS ON, 2723*
MOTILITY, 2707

IRON
BINDING
PROTEINS, 2890
DEFICIENCY
CONTRACEPTIVES, ORAL, 2667
INTESTINAL ABSORPTION
CONTRACEPTIVES, ORAL, 2667
DEFICIENCY, 2667, 2669
DRUG EFFECTS ON, 2667
INTESTINE, SMALL
ABSORPTION, 2890
BINDING, 2890
METABOLISM
GASTRECTOMY, 3135
RADIONUCLIDES, 3419
NUTRITION DISORDERS
METABOLISM, 3443

IRRADIATION
ESOPHAGITIS, 3037

IRRITABLE COLON
DIARRHEA
DRUG THERAPY, 3405*
PROCTITIS
PATHOLOGY, 3185*

ISCHEMIA
ENTEROCOLITIS, NECROTIZING
ETIOLOGY, 3409*
INTESTINE, SMALL, 3163

ISOENZYMES
FECES
ALKALINE PHOSPHATASE, 2982
AMYLASES, 2982
ELECTROPHORESIS, 2982
PANCREATIC DISEASES
AMYLASES, 3010
PANCREATITIS
AMYLASES, 3010

JAUNDICE
BILIRUBIN
METABOLISM, 3361*
DIAGNOSIS
TOMOGRAPHY, 3399
ULTRASONOGRAPHY, 3399

JAUNDICE, CHOLESTATIC
DIAGNOSIS, 3372
SCANNING, SCINTILLATION, 3401
TOMOGRAPHY, 3370
ULTRASONOGRAPHY, 3401

JAUNDICE, CHRONIC IDIOPATHIC
LIVER
PATHOLOGY, 3300*
MITOCHONDRIA
LIVER, 3300*

JAUNDICE, OBSTRUCTIVE
CHOLESTEROL
METABOLISM, 3290
DIAGNOSIS
CHOLANGIOGRAPHY, 3400
ENDOSCOPY, 3400
LIPIDS, 3290
ULTRASONOGRAPHY, 2959*
LIPIDS
METABOLISM, 3290

JEJUNUM
SEE ALSO INTESTINE, SMALL
ANOMALY, CONGENITAL
ATRESIA, 3162
HEMORRHAGE
NEUROFIBROMATOSIS, 3150
HYPERPLASIA
CIRCADIAN RHYTHM, 2748
STARVATION, 2748
ISOLATION
MORPHOLOGY, 3145*
ULTRASTRUCTURE, 3145*
NEOPLASM METASTASIS
COMPLICATIONS, 3165
PERFORATION, 3165
PURINES
METABOLISM, 2870*
SECRETION
GASTRIN, 2746
PRESSURE STUDY, 2867*
STOMACH
ACID SECRETION, 2746
SURGERY
COMPLICATIONS, 3192
TOXICITY
ALCOHOLS, 2886
TRANSPORT
AMINO ACIDS, 2657*
FOLIC ACID, 2657*, 2664*
GLUCOSE, 2657*
XYLOSE, 2657*

KERNICTERUS
BILIRUBIN
BRAIN, 2800*
DEAFNESS, 2800*
ULTRASTRUCTURE, 2800*

KIDNEYS
CYSTS
DIAGNOSIS, 3016
TOMOGRAPHY, 3016
ULTRASONOGRAPHY, 3016
TRANSPLANTATION
COLONIC DISEASES, 3180*
COMPLICATIONS, 3180*, 3296

KIDNEYS (continued)
TRANSPLANTATION (continued)
LIVER DISEASES, 3296
ULCER, PEPTIC, 3097*
VITAMIN B12
HOMEOSTASIS, 2852

LACTASE
CIRCADIAN RHYTHM
FEEDING, 2872*
GASTROINTESTINAL DISEASES
DEFICIENCY, 3439
INTESTINES
CIRCADIAN RHYTHM, 2872*
FEEDING, 2872*
FETUS, 2872*
MALABSORPTION SYNDROMES
DEFICIENCY, 3439

LACTASE DEFICIENCY
SEE LACTOSE INTOLERANCE

LACTOSE INTOLERANCE
MILK
DEFECATION, 3175

LAMBLIASIS
SEE GIARDIASIS

LAPAROSCOPY
ANESTHESIA, 3430

LARGE INTESTINE
SEE INTESTINE, LARGE

LASER
DUODENUM
BLEEDING, 2922
GASTROINTESTINAL SYSTEM
BLEEDING, 2922
HEMORRHAGE
CLOTTING, 3453
ENDOSCOPY, 3453
STOMACH
BLEEDING, 2922

LAXATIVES
SEE CATHARTICS

LIPASE
DUODENUM, 2765
INTESTINE, SMALL, 2765
PANCREAS
SECRETION, 2765
PANCREAS FUNCTION TESTS, 2950*

LIPIDS
SEE ALSO FATS, TRIGLYCERIDES
ANUS
SECRETION, 2889
BILE
AGE FACTORS, 2816
CHENODEOXYCHOLIC ACID, 2790*
CHROMATOGRAPHY, 2845
DRUG EFFECTS ON, 3395
GILBERT'S DISEASE, 3301
MENSTRUAL CYCLE, 2787*
PHOSPHOLIPIDS, 3382
PHYSICAL ACTIVITY, 2821
VAGOTOMY, 3393

LIPIDS (continued)
CHENODEOXYCHOLIC ACID
CHOLESTEROL, 2790*
COLITIS, ULCERATIVE
BILE, 3464*
DIETARY FACTORS
FIBERS, 2908*
ENTERECTOMY
BILE, 3464*
ERYTHROCYTES
PHYSICAL ACTIVITY, 2821
HEPATOCYTES
STARVATION, 2859
ILEITIS
BILE, 3464*
INFLAMMATORY BOWEL DISEASES
BILE, 3464*
METABOLISM, 3464*
INTESTINAL ABSORPTION
ENZYMES, 2875*
ULTRASTRUCTURE, 2655*
INTESTINE, SMALL
ABSORPTION, 2655*
ENZYMES, 2875*
TRANSPORT, 2655*
JAUNDICE, OBSTRUCTIVE
DIAGNOSIS, 3290
METABOLISM, 3290
LIVER
CARBON TETRACHLORIDE, 2846
DETERGENTS, 2826
ESTROGENS, 2797*
HYPOCHOLESTEROLEMIA, 2797*
STARVATION, 2859
SYNTHESIS, 2833
PORTACAVAL SHUNT
METABOLISM, 2847
SYNTHESIS
FETUS, 2833

LIPODYSTROPHY, INTESTINAL
COMPLICATIONS
MUSCLES, 3172*
DIAGNOSIS, 3177
ETIOLOGY, 3177
LIVER CIRRHOSIS
BIOCHEMISTRY, 3289
PAIN, 3177
THERAPY, 3176

LIPOMA
LIVER
RADIOLOGY, 3274

LIPOPROTEINS
DIETARY FACTORS
FIBERS, 2908*

LIVER
ABSCESS, 3276
DIAGNOSIS, 3017
ULTRASONOGRAPHY, 3017
ADENOSINE TRIPHOSPHATASE, 2837
ALBUMINS
SYNTHESIS, 2810
ALCOHOL OXIDOREDUCTASES
KINETICS, 2781*
ALPHA 1 ANTITRYPSIN
DEFICIENCY, 3278, 3279

LIVER (continued)
AMEBIASIS
ABSCESS, 2937
DIAGNOSIS, 3454*
AMINES
REGENERATION, 3339*
ANOMALY, 3277
ATROPHY
STARVATION, 2859
AUSTRALIA ANTIGEN
TECHNIQUES, 3314
BILE ACIDS AND SALTS
CIRCULATION, 2784*, 2785*
BILE DUCTS
NEOPLASMS, MALIGNANT, 3259*
BILIRUBIN
METABOLISM, 2811
BIOPSY
BLEEDING, 3012
COMPLICATIONS, 2956*, 3012, 3288
HEMATOBILIA, 3288
RISK FACTORS, 2956*
TECHNIQUES, 3012
CALCIFICATION
ETIOLOGY, 3018
HERPESVIRUSES, 3018
INFECTION, 3018
NEONATE, 3018
TOXOPLASMOSIS, 3018
VIRUS DISEASES, 3018
CELL CULTURE
TECHNIQUES, 2804
CHOLESTEROL
DRUGS, 2789*
METABOLISM, 2789*
SYNTHESIS, 3394
CIRCULATION, 2942
ALCOHOLISM, 2780*
ANESTHESIA, 3268
ANESTHETICS, 2941
ANGIOGRAPHY, 2941
BILE ACIDS AND SALTS, 3336*
CLEARANCE STUDY, 2943
DRUG EFFECTS ON, 2941
CLEARANCE STUDY, 2851
CHILD, 2849
COLLAGEN
ENZYMES, 3333
HISTOCHEMISTRY, 2642
IMMUNOLOGY, 2642
METABOLISM, 3333
SYNTHESIS, 2794*
CYSTS
CARCINOGENS, 2799*
DIAGNOSIS, 3016, 3456*
DRUG-INDUCED, 2799*
DRUG THERAPY, 3456*
ECHINOCOCCOSIS, 3456*
REVIEW, 3256*
TOMOGRAPHY, 3016
ULTRASONOGRAPHY, 3016
ULTRASTRUCTURE, 2799*
CYTOLOGY
EMBRYOLOGY, 2646
FETUS, 2646
DETERGENTS
CHOLESTEROL, 2797*
DRUG EFFECTS ON
ANTINEOPLASTIC AGENTS, 3261*, 3262*

LIVER (continued)
DRUG EFFECTS ON (continued)
HYPERLIPEMIC AGENTS, 2836
DRUG METABOLISM, 2802, 2838
ALCOHOLISM, 2808
CADMIUM, 2843
GENETIC FACTORS, 2807
ECHINOCOCCOSIS
COMPLICATIONS, 3283
DIAGNOSIS, 3282, 3284, 3456*
DRUG THERAPY, 3456*
EPIDEMIOLOGY, 3282
IMMUNOLOGY, 3456*
PROGNOSIS, 3283
SCANNING, SCINTILLATION, 3284
SURGERY, 3283
ULTRASONOGRAPHY, 3284, 3456*
EMBOLIZATION
CLEARANCE STUDY, 2778*
TOXICITY, 2778*
ENDOSCOPY, 2975
ENZYMES
CADMIUM, 2843
FATTY ACIDS
METABOLISM, 2833
FIBROSIS
ENZYMES, 2855
ETIOLOGY, 2855
GLUCONEOGENESIS
ALCOHOLISM, 2911
GLUCOSE PHOSPHATE DEHYDROGENASE
DIETARY FACTORS, 2834
FEEDING, 2834
GLYCOGEN
METABOLISM, 2841
GLYCOGENOLYSIS
ENDOTOXINS, 2841
GRANULOMA
REVIEW, 3257*
HEME
SYNTHESIS, 2844
INFECTION, 3280
HEPATECTOMY, 3281
PROGNOSIS, 3281
SURGERY, 3281
JAUNDICE, CHRONIC IDIOPATHIC
MITOCHONDRIA, 3300*
PATHOLOGY, 3300*
KETONE BODIES
SYNTHESIS, 2833
LIPIDS
CARBON TETRACHLORIDE, 2846
DETERGENTS, 2826
ESTROGENS, 2797*
HYPOCHOLESTEROLEMIA, 2797*
STARVATION, 2859
SYNTHESIS, 2833
LIPOMA
RADIOLOGY, 3274
LYSOSOMES
PERMEABILITY, 2806
MEMBRANES
DETERGENTS, 2826
METABOLISM, 3267
ACETYLCHOLINE, 2842
GLYCOGEN, 2842
HYPOXIA, 3266
TRIGLYCERIDES, 2842

LIVER (continued)
MICROSOMES
CARBON TETRACHLORIDE, 2846
TOXINS, 3305
MORPHOLOGY, 3013
ANTINEOPLASTIC AGENTS, 3261*, 3262*
DRUG EFFECTS ON, 3261*, 3262*
EDEMA, 2940
EMBRYOLOGY, 2646
FETUS, 2646
MAGNESIUM, 2805
NEOPLASM METASTASIS
DEARTERIALIZATION, 3255*
DRUG THERAPY, 3181*
PREVENTION, 3181*
RADIOTHERAPY, 3270
THERAPY, 3255*
NEOPLASMS
CHILD, 3272
CONTRACEPTIVES, 3271
DRUG THERAPY, 3271
ETIOLOGY, 3254*
PATHOLOGY, 3254*
REVIEW, 3254*
NEOPLASMS, MALIGNANT
CHILD, 3275
FERRITIN, 2839
RADIOTHERAPY, 3270
REVIEW, 3259*
ORGAN CULTURE
MAGNESIUM, 2805
PATHOLOGY
DISEASES ASSOCIATED WITH, 3266
HYPOXIA, 3266
PERFUSION
PROGNOSIS, 3286
PHOSPHOLIPIDS
DIETARY FACTORS, 2834
FEEDING, 2834
PLASMA
PERFUSION, 2803
PORTACAVAL SHUNT
REGENERATION, 3339*
PROTEINS
SYNTHESIS, 2860
REGENERATION
ALCOHOLS, 2862
AMMONIA, 2861
DRUG EFFECTS ON, 2862
EDEMA, 2940
SCLEROSIS, 3291
SERUM
AMYLASES, 2809
SHUNT, INTESTINAL
DRUG THERAPY, 2865*
SULFOBROMOPHTHALEIN
CLEARANCE STUDY, 2849
SURGERY
REGENERATION, 3339*
SYNTHESIS
CLOTTING, 2795*
TOMOGRAPHY, 2986
TOXICITY
GALACTOSAMINE, 2840
TOXINS, 3304
OCCUPATIONAL FACTORS, 3303
TRANSPLANTATION
CIRCULATION, 3295, 3297

LIVER (continued)
TRANSPLANTATION (continued)
CLOTTING, 3263*
TECHNIQUES, 2947, 3295, 3297
TRANSPORT
AMINO ACIDS, 2783*
TRIGLYCERIDES
ALCOHOLS, 2830
DRUG EFFECTS ON, 2830
METABOLISM, 2830
TRACER STUDY, 2830
ULTRASTRUCTURE
AGE FACTORS, 2647
ANTINEOPLASTIC AGENTS, 3261*, 3262*
DRUG EFFECTS ON, 3261*, 3262*
STARVATION, 2859
VITAMIN B12
HOMEOSTASIS, 2852
VITAMIN C
DEFICIENCY, 2844
SYNTHESIS, 2844
WOUNDS AND INJURIES
HEMATOMA, 3273

LIVER CIRRHOSIS
ALCOHOLISM
DRUG THERAPY, 3348
VITAMIN A, 3348
ANTIBODIES, 3317
PROGNOSIS, 3320
ANTIGENS
PROGNOSIS, 3320
ASCITES
ANTIBIOTICS, 3344
DRUG THERAPY, 3344
HORMONES, ADRENAL CORTEX, 3342
RENIN, 3342
AUSTRALIA ANTIGEN
CARRIER STATE, 3320
COLLAGEN
SYNTHESIS, 2794*
COMPLICATIONS
UROGENITAL SYSTEM, 3341
DRUG THERAPY
VITAMIN A, 3348
EDEMA
ANTIBIOTICS, 3344
DRUG THERAPY, 3344
HYPOGONADISM
REVIEW, 3338*
LIPODYSTROPHY, INTESTINAL
BIOCHEMISTRY, 3289
LIVER DISEASES, ALCOHOLIC
DRUG THERAPY, 3348
VITAMIN A, 3348
PORTACAVAL SHUNT
PROGNOSIS, 3345
SURVIVAL, 3345
SPLEEN
IMMUNOLOGY, 2939
UROGENITAL SYSTEM
NERVOUS CONTROL, 3341
VITAMIN D
DEFICIENCY, 3351
METABOLISM, 3351

LIVER CIRRHOSIS, OBSTRUCTIVE
DRUG THERAPY, 3347
VITAMIN D, 3349

LIVER CIRRHOSIS, OBSTRUCTIVE (continued)
MALABSORPTION SYNDROMES
VITAMIN D, 3350
VITAMIN D
DEFICIENCY, 3350

LIVER COMA
ETIOLOGY
REVIEW, 3298
PERFUSION
PROGNOSIS, 3286
PLASMA
REGENERATION, 2861
SHOCK, 2946
SLEEP, 2945
SPLENORENAL SHUNT, 3346
THERAPY, 3285, 3287

LIVER DISEASES
ANTIBODIES, 3317
BILE ACIDS AND SALTS
FEEDING, 2961*
CIRCULATION
SCANNING, SCINTILLATION, 3337*
COMPLICATIONS
RESPIRATORY SYSTEM, 3253*
DIAGNOSIS
BILE ACIDS AND SALTS, 2960*, 2961*
ENDOSCOPY, 2975
TOMOGRAPHY, 2986
HEMODIALYSIS
COMPLICATIONS, 3296
IMMUNOLOGY
REVIEW, 3252*
KIDNEYS
TRANSPLANTATION, 3296
LYMPHOCYTES
TOXICITY, 3264
SCANNING, SCINTILLATION
SPLEEN, 3337*
SERUM
BILE ACIDS AND SALTS, 2960*, 2961*
TOXICITY
PROTEINS, 3264

LIVER DISEASES, ALCOHOLIC
ALKALINE PHOSPHATASE
METABOLISM, 3334
COLLAGEN
ENZYMES, 3333
METABOLISM, 3333
DIAGNOSIS
ALKALINE PHOSPHATASE, 3334
DISEASES ASSOCIATED WITH
COLLAGEN DISEASES, 3333
DRUG THERAPY, 3335
ENZYMES, 3425
IMMUNOGLOBULINS, 2936
LIVER CIRRHOSIS
DRUG THERAPY, 3348
VITAMIN A, 3348
SERUM
ALKALINE PHOSPHATASE, 3334
THERAPY, 3335

LIVER INJURY
ALCOHOLS
ENZYMES, 2782*
OXIDOREDUCTASES, 2782*

LIVER INJURY (continued)
BILIARY TRACT DISEASES
OXYGEN, 3265
THERAPY, 3265
CARBON TETRACHLORIDE
ANTIBIOTICS, 2853
ENTEROTOXINS, 2853
DRUG-INDUCED
BIOCHEMISTRY, 3302*
PATHOLOGY, 3302*
REVIEW, 3302*
THERAPY, 3302*
ENTEROTOXINS
ANTIBIOTICS, 2853
ESTROGENS, 2796*
ETIOLOGY
REVIEW, 3298
GALACTOSAMINE
PREVENTION, 2840
PREVENTION
ANTIBIOTICS, 2853
ANTIOXIDANTS, 2840
SIMULATION
DRUG-INDUCED, 2854

LUNG
SEE RESPIRATORY SYSTEM

LYMPH
DYSPLASIA
COMPLICATIONS, 3440

LYMPHATIC SYSTEM
ANTIGENS
FEEDING, 2912, 2913
GASTROINTESTINAL DISEASES
ETIOLOGY, 2928
INTESTINES
ANTIGENS, 2912, 2913

LYMPHOCYTES
GASTRITIS, 3070
INTESTINE, SMALL
FETUS, 2635*
LIVER DISEASES
TOXICITY, 326'

LYMPHOGRAPHY
RECTUM
NEOPLASM METASTASIS, 2974

LYMPHOMA
INTESTINE, SMALL
DIAGNOSIS, 3141*
STOMACH
RADIOLOGY, 3044*

LYSOSOMES
LIVER
PERMEABILITY, 2806

MAGNESIUM
DUODENUM
ULCER, PEPTIC, 3126
LIVER
MORPHOLOGY, 2805
ORGAN CULTURE, 2805

MAGNESIUM (continued)
PANCREAS
BICARBONATE SECRETION, 2762
SECRETION, 2761
ULCER, PEPTIC
ACID SECRETION, 3126

MALABSORPTION SYNDROMES
ABSORPTION
DISACCHARIDES, 3178
MONOSACCHARIDES, 3178
BILE ACIDS AND SALTS
BREATH TEST, 2949*
DIAGNOSIS, 2949*
FECES, 2949*
BIOCHEMISTRY, 3173
CHILD
ETIOLOGY, 3439
DIAGNOSIS, 3416, 3417
TECHNIQUES, 2998, 2999
XYLOSE, 2999
DIGESTION
DISACCHARIDES, 3178
MONOSACCHARIDES, 3178
ENTEROKINASE
DEFICIENCY, 3157
ILEOSTOMY
COMPLICATIONS, 3148*
LACTASE
DEFICIENCY, 3439
LIVER CIRRHOSIS, OBSTRUCTIVE
VITAMIN D, 3350
MILK
ANTIGENS, 3414
PATHOLOGY, 3173
SUCRASE
DEFICIENCY, 3157
VITAMIN B12
PANCREATIC DISEASES, 2724*
PEPTIDE HYDROLASES, 2724*

MALIGNANT
SEE NEOPLASMS, MALIGNANT

MALLORY-WEISS SYNDROME
DISEASES ASSOCIATED WITH, 3442

MALNUTRITION
SEE NUTRITION DISORDERS

MANOMETRY
BILE DUCTS
ENDOSCOPY, 3375
TECHNIQUES, 3375
COMMON BILE DUCT
TECHNIQUES, 2695
DUODENUM
MOTILITY, 2697
ESOPHAGUS
MOTILITY, 2705
TECHNIQUES, 2705
INTESTINE, SMALL
MOTILITY, 2697
ODDI'S SPHINCTER, 3374
DRUG EFFECTS ON, 2694
ENDOSCOPY, 3375
MOTILITY, 2691, 2694
PARASYMPATHOLYTICS, 2694
TECHNIQUES, 2691, 3375

MARASMUS
IMMUNOLOGY, 3411*

MEGACOLON
COLITIS, ULCERATIVE
COMPLICATIONS, 3207*
SURGERY, 3207*

MEGAESOPHAGUS
SEE ACHALASIA

MELENA
NEONATE
PREGNANCY, 3444
PREGNANCY
RISK FACTORS, 3444

MENETRIER'S DISEASE
DIAGNOSIS, 3072
NEOPLASMS
ULCER, 3049*
STOMACH
NEOPLASMS, 3049*
ULCER, 3049*

MESENTERY
CIRCULATION
VASOPRESSIN, 2944
CYSTS
COMPLICATIONS, 3152
INFLAMMATION, 3152

METAPLASIA
DUODENUM
MORPHOLOGY, 2639*
INTESTINE, SMALL, 3056*
STOMACH
MORPHOLOGY, 2639*

METASTASIS
SEE NEOPLASM METASTASIS

MICELLES
BILE
TRANSPORT, 2814

MICROSOMES
LIVER
CARBON TETRACHLORIDE, 2846
TOXINS, 3305

MILK
BACTERIA, 3420
FECES
BACTERIA, 2894*
INTESTINES
BACTERIA, 2894*
LACTOSE INTOLERANCE
DEFECATION, 3175
MALABSORPTION SYNDROMES
ANTIGENS, 3414

MITOCHONDRIA
ANOMALY
OBESITY, 3143*
HEPATOCYTES
OBESITY, 3143*
JAUNDICE, CHRONIC IDIOPATHIC
LIVER, 3300*

MITOSIS
GASTRITIS
CELLS, 3071
GASTROINTESTINAL SYSTEM
CELLS, 2910
INTESTINE, SMALL, 2951*
INTESTINAL OBSTRUCTION, 2898*
SURGERY, 3156
STOMACH
ACID SECRETION, 3071
CELLS, 3071
DRUG EFFECTS ON, 3051*
ULCER, PEPTIC, 3051*

MONOSACCHARIDES
MALABSORPTION SYNDROMES
ABSORPTION, 3178
DIGESTION, 3178

MOTILIN
ANTRUM
MOTILITY, 2698
PLASMA
AGE FACTORS, 2914
INFANT, 2914
SECRETION
AGE FACTORS, 2914
INFANT, 2914
STOMACH
MOTILITY, 2698

MOTILITY
ANTRUM
ELECTRICAL CONTROL, 2680*
ESOPHAGEAL REFLUX, 3023*
ESOPHAGITIS, 3023*
GASTRIN, 2698
HORMONE CONTROL, 2698
HORMONE EFFECTS ON, 2698
MOTILIN, 2698
NERVOUS CONTROL, 2680*
VAGOTOMY, 2747
CHOLELITHIASIS
STOMACH, 3356*
DUODENUM
CERULEIN, 2677*
CHOLECYSTOKININ, 2677*
ELECTRICAL CONTROL, 2696, 2697, 2699
FEEDING, 2756
GLUCAGON, 2677*
HORMONE CONTROL, 2677*
HORMONE EFFECTS ON, 2677*
HORMONES, GASTROINTESTINAL, 2677*
MANOMETRY, 2697
ESOPHAGITIS
PROSTAGLANDINS, 3038
ESOPHAGUS
DIVERTICULUM, 3035
MANOMETRY, 2705
NERVOUS CONTROL, 2673*
PROSTAGLANDINS, 3038
RADIOLOGY, 2993
REVIEW, 2993
SPHINCTER, 2673*, 3038
TECHNIQUES, 2700
GALLBLADDER
CHOLECYSTOKININ, 2684*, 2702
HORMONE CONTROL, 2684*, 2702

MOTILITY (continued)
GALLBLADDER (continued)
HORMONE EFFECTS ON, 2702
HORMONES, GASTROINTESTINAL, 2684*
GASTROINTESTINAL SYSTEM
DRUG EFFECTS ON, 3427
MUSCLES, 2674*
TECHNIQUES, 2689
ILEUM
ATROPINE, 2686
DRUG EFFECTS ON, 2678*, 2686
DRUG-INDUCED, 2685, 2686
ELECTROPHYSIOLOGY, 2685
ION TRANSPORT, 2685, 2686
TECHNIQUES, 2710
INTESTINE, SMALL
ATROPINE, 2686
DRUG EFFECTS ON, 2678*, 2686
DRUG-INDUCED, 2685, 2686
ELECTRICAL CONTROL, 2697, 2699
ELECTROPHYSIOLOGY, 2675*
HORMONE CONTROL, 2643, 2676*, 2677*
HORMONE EFFECTS ON, 2677*
HORMONES, GASTROINTESTINAL, 2677*
ION TRANSPORT, 2685, 2686
MANOMETRY, 2697
MUSCLES, 2675*
NERVOUS CONTROL, 2643, 2676*
INTESTINES
DISTENTION, 2704
DRUG EFFECTS ON, 2688
HORMONE CONTROL, 2643
INTESTINAL OBSTRUCTION, 2704
NERVOUS CONTROL, 2643
PSEUDO-OBSTRUCTION, 3146*, 3147*
MUSCLES
TECHNIQUES, 2674*
ODDI'S SPHINCTER
DRUG EFFECTS ON, 3427
ELECTRICAL CONTROL, 2696
HORMONE CONTROL, 2692
MANOMETRY, 2691, 2694
NERVOUS CONTROL, 2692
TECHNIQUES, 2693
PYLORUS
HISTAMINE, 2690
RECTUM
CALCIUM, 2687
DRUG EFFECTS ON, 2687
ION TRANSPORT, 2687
STOMACH
ANTRECTOMY, 2679*, 3132
CALCIUM, 2707
CHOLECYSTOKININ, 2681*
DISTENTION, 2681*
DRUG EFFECTS ON, 2681*, 2683*, 2690, 2707
ELECTRICAL CONTROL, 2680*, 2683*, 2699
ESOPHAGEAL REFLUX, 3023*
ESOPHAGITIS, 3023*
GASTRIN, 2698
GASTRITIS, ATROPHIC, 3005
HISTAMINE, 2690
HORMONE CONTROL, 2698
HORMONE EFFECTS ON, 2682*, 2698, 2703
ION TRANSPORT, 2707

MOTILITY (continued)
STOMACH (continued)
MOTILIN, 2698
MUSCLES, 2674*
NERVOUS CONTROL, 2679*, 2680*, 2683*, 2701, 2706
PENTAGASTRIN, 2703
PROSTAGLANDINS, 2707
PYLOROPLASTY, 2679*
ULCER, PEPTIC, 3094*, 3113
VAGOTOMY, 2679*, 2701, 2708, 2709, 3061, 3132

MOVEMENT DISORDERS
ODDI'S SPHINCTER
DIAGNOSIS, 3363*

MUCIN
ILEUM
CROHN'S DISEASE, 3462*
INTESTINE, SMALL
CROHN'S DISEASE, 3462*

MUCUS
GASTROINTESTINAL SYSTEM
BARIUM, 2921
CONTRAST MEDIA, 2921
INTESTINE, SMALL
SECRETION, 2883
INTESTINES
BARIUM, 2921
CONTRAST MEDIA, 2921
STOMACH
BARIUM, 2921
CONTRAST MEDIA, 2921
DRUG EFFECTS ON, 3051*
ULCER, PEPTIC, 3051*

MUSCLES
DUODENUM
MORPHOLOGY, 2711
NERVOUS CONTROL, 2711
GASTROINTESTINAL SYSTEM
DRUG EFFECTS ON, 3427
MOTILITY, 2674*
SPASM, 3427
INTESTINE, SMALL
CIRCULATION, 2897*
MOTILITY, 2675*
LIPODYSTROPHY, INTESTINAL
COMPLICATIONS, 3172*
PROSTAGLANDINS, 2629*
STOMACH
MOTILITY, 2674*
TECHNIQUES
MOTILITY, 2674*

MYCOSES
ABDOMEN, 3203
APPENDICITIS
COMPLICATIONS, 3203
APPENDIX, 3203
CECUM, 3203
ILEUM, 3203

NECROSIS
PANCREAS
THERAPY, 3241

NECROSIS (continued)
PANCREATITIS
THERAPY, 3246

NEONATE
DIAPHRAGM
HERNIA, 3441
FECES
BACTERIA, 2894*
INTESTINE, SMALL
PROTEINS, 2877*
INTESTINES
BACTERIA, 2894*
LIVER
CALCIFICATION, 3018
MELENA
PREGNANCY, 3444

NEOPLASM METASTASIS
DUODENUM
ENDOSCOPY, 2996
INTESTINE, SMALL
COMPLICATIONS, 3165
PERFORATION, 3165
JEJUNUM
COMPLICATIONS, 3165
PERFORATION, 3165
LIVER
DEARTERIALIZATION, 3255*
DRUG THERAPY, 3181*
PREVENTION, 3181*
RADIOTHERAPY, 3270
THERAPY, 3255*
RECTUM
DIAGNOSIS, 2974
LYMPHOGRAPHY, 2974
SCANNING, SCINTILLATION, 2974

NEOPLASMS
BILE DUCTS
REVIEW, 2648
COLON
HERNIA, 3201
INFLAMMATION, 3201
GALLBLADDER
CLASSIFICATION, 3379
LIVER
CHILD, 3272
CONTRACEPTIVES, 3271
DRUG THERAPY, 3271
ETIOLOGY, 3254*
PATHOLOGY, 3254*
REVIEW, 3254*
MENETRIER'S DISEASE
STOMACH, 3049*
ULCER, 3049*
PANCREAS
SECRETION, 3212*
SIGMOID
HERNIA, 3201
INFLAMMATION, 3201
STOMACH
DIAGNOSIS, 3076
DRUG THERAPY, 3090
ENDOSCOPY, 3076
PROGNOSIS, 3093
SURGERY, 3093
VATER'S AMPULLA
ENDOSCOPY, 3376
THERAPY, 3376

NEOPLASMS, BENIGN
GALLBLADDER
ETIOLOGY, 3379
THERAPY, 3379
STOMACH
CARCINOEMBRYONIC ANTIGEN, 3064

NEOPLASMS, MALIGNANT
COLON
BACTERIA, 2895*
DIAGNOSIS, 2953*, 2954*, 3042*
DIETARY FACTORS, 2891, 2895*
DRUG THERAPY, 3181*, 3182*
ETIOLOGY, 2891
FAMILIAL FACTORS, 3184*
GARDNER'S SYNDROME, 3197
DRUG THERAPY
COMPLICATIONS, 3054*
DUODENUM
ENDOSCOPY, 2996
GALLBLADDER
ETIOLOGY, 3379
THERAPY, 3379
GARDNER'S SYNDROME
COMPLICATIONS, 3197
GASTROINTESTINAL SYSTEM
ALPHA FETOPROTEIN, 2984
ANTIGENS, 2984
DIAGNOSIS, 2984, 2992
INTESTINE, LARGE
DIAGNOSIS, 2952*
HISTOCHEMISTRY, 2952*
LIVER
BILE DUCTS, 3259*
CHILD, 3275
FERRITIN, 2839
RADIOTHERAPY, 3270
REVIEW, 3259*
PANCREAS
AMYLASES, 3011
BACTERIAL INFECTIONS, 3231*
COMPLICATIONS, 3231*
DIAGNOSIS, 3226
REVIEW, 3221
SECRETION, 3216
ULTRASONOGRAPHY, 3226
RECTUM
DIAGNOSIS, 2953*, 2954*
DRUG THERAPY, 3181*, 3182*, 3202
SURVIVAL, 3202
THERAPY, 3202
STOMACH
AGE FACTORS, 3092
ANGIOGRAPHY, 2972
BIOPSY, 3003, 3043*
CARCINOEMBRYONIC ANTIGEN, 3064
CYTOLOGY, 3003, 3043*
DIAGNOSIS, 2972, 2976, 2977, 3003, 3043*, 3092
ENDOSCOPY, 2976, 2977, 3003, 3043*
ENZYMES, 3046*
GLUCURONIDASE, 3045*
GLYCOLYSIS, 3057*
RADIOLOGY, 2976, 3043*
THERAPY, 3092
VATER'S AMPULLA
DIAGNOSIS, 3380
ENDOSCOPY, 3380

NERVOUS CONTROL
ANTRUM
MOTILITY, 2680*
DUODENUM
MUSCLES, 2711
ESOPHAGUS
ACHALASIA, 3019*
MOTILITY, 2673*
SPHINCTER, 2673*
INTESTINE, SMALL
DRUG EFFECTS ON, 2632*
MOTILITY, 2643, 2676*
INTESTINES
MOTILITY, 2643
LIVER CIRRHOSIS
UROGENITAL SYSTEM, 3341
ODDI'S SPHINCTER
MOTILITY, 2692
STOMACH
MOTILITY, 2679*, 2680*, 2683*, 2701, 2706

NERVOUS SYSTEM
ABDOMEN
GASTRIN, 2712*
INTESTINE, SMALL
DRUG EFFECTS ON, 2632*
HORMONES, GASTROINTESTINAL, 2643
ULTRASTRUCTURE, 2632*
INTESTINES
HORMONES, GASTROINTESTINAL, 2643

NITROGEN
DUODENUM
ULCER, PEPTIC, 3110
DYSPEPSIA, 3110

NUCLEIC ACIDS
INFLAMMATORY BOWEL DISEASES, 3211

NUTRITION DISORDERS
CHILD, 3443
PROGNOSIS, 3415
DIAGNOSIS, 3416, 3417
ENTEROKINASE
DEFICIENCY, 3157
INTESTINES
EMBRYOLOGY, 2927
IRON
METABOLISM, 3443
PROGNOSIS
DIARRHEA, 3415
EDEMA, 3415
STOMACH
ACID SECRETION, 3418
ACIDITY, 3418
PEPSIN, 3418
SECRETION, 3418
SUCRASE
DEFICIENCY, 3157
THERAPY
PARENTERAL ALIMENTATION, 3467*

OBESITY
BILE
CHOLESTEROL, 3391
HEPATOCYTES
MITOCHONDRIA, 3143*
MITOCHONDRIA
ANOMALY, 3143*
SHUNT, INTESTINAL
DIETARY FACTORS, 3144*

OBSTRUCTION
BILE DUCTS, 3367
BILIARY TRACT
CHOLESTASIS, 2858
COLON, 3192
DUODENUM
ANGIOGRAPHY, 2980
DIAGNOSIS, 2980
RADIOLOGY, 2980
INTESTINE, SMALL, 3160
ANGIOGRAPHY, 2980
CIRCULATION, 2923
DIAGNOSIS, 2978, 2980
OXYGEN, 2923
RADIOLOGY, 2980
PANCREAS
BICARBONATE SECRETION, 2776
SECRETION, 2776
PANCREATIC DUCT
BICARBONATE SECRETION, 2776
DIAGNOSIS, 3236
SECRETION, 2776

OBSTRUCTIVE JAUNDICE
SEE JAUNDICE, OBSTRUCTIVE

ODDI'S SPHINCTER
ENDOSCOPY
CHOLANGITIS, 3352*
CHOLECYSTITIS, 3352*
COMPLICATIONS, 3352*
HEMORRHAGE, 3352*
PANCREATITIS, 3352*
INFLAMMATION
DIAGNOSIS, 3362*
THERAPY, 3362*
MANOMETRY, 3374
DRUG EFFECTS ON, 2694
ENDOSCOPY, 3375
PARASYMPATHOLYTICS, 2694
TECHNIQUES, 2691, 3375
MOTILITY
DRUG EFFECTS ON, 3427
ELECTRICAL CONTROL, 2696
HORMONE CONTROL, 2692
MANOMETRY, 2691, 2694
NERVOUS CONTROL, 2692
TECHNIQUES, 2693
MOVEMENT DISORDERS
DIAGNOSIS, 3363*
RADIOLOGY
TECHNIQUES, 2692
SPASM
DRUG EFFECTS ON, 3427
SURGERY, 3374
COMPLICATIONS, 3365*

ORAL CONTRACEPTIVES
SEE CONTRACEPTIVES, ORAL

ORGAN CULTURE
GALLBLADDER
ULTRASTRUCTURE, 2640*

ORGAN CULTURE (continued)
LIVER
MAGNESIUM, 2805
SPRUE
DIAGNOSIS, 2997

OXIDOREDUCTASES
ALCOHOLS
ALDEHYDES, 2779*
ALDEHYDES
CHEMICAL PROPERTIES, 2779*
LIVER INJURY
ALCOHOLS, 2782*

OXYGEN
BILIARY TRACT DISEASES
LIVER INJURY, 3265
INTESTINE, SMALL
DISTENTION, 2923
OBSTRUCTION, 2923
TRANSPORT, 2899*

PAIN
LIPODYSTROPHY, INTESTINAL, 3177
ULCER, PEPTIC
ANTACIDS, 3119
DRUG THERAPY, 3119

PANCREAS
ANEURYSM
DIAGNOSIS, 3227
ANOMALY, 3222
ARTERIES
ANEURYSM, 3227
BICARBONATE SECRETION
ALCOHOLISM, 2757
ATROPINE, 2759
CALCIUM, 2762
DRUG EFFECTS ON, 2759
ENTERECTOMY, 2777
HORMONE EFFECTS ON, 2760
MAGNESIUM, 2762
SECRETIN, 2771
THYROCALCITONIN, 2760
CYSTIC FIBROSIS
ALPHA FETOPROTEIN, 3213*
DIGESTION
PROTEINS, 2770
DRUG EFFECTS ON
PEPTIDES, 2750*
ELECTROPHYSIOLOGY
DRUG EFFECTS ON, 2750*
PEPTIDES, 2750*
ENDOSCOPY
COMPLICATIONS, 3353*
PANCREATOGRAPHY, 3009
ENZYMES
DRUG EFFECTS ON, 2767
ION TRANSPORT, 2749*
CALCIUM, 2658*
MORPHOLOGY
ALCOHOLISM, 2757
DRUG EFFECTS ON, 2764
RADIOLOGY, 3009
MUSCARINIC RECEPTORS, 2755
NECROSIS
THERAPY, 3241

PANCREAS (continued)
NEOPLASMS, MALIGNANT
AMYLASES, 3011
BACTERIAL INFECTIONS, 3231*
COMPLICATIONS, 3231*
DIAGNOSIS, 3226
REVIEW, 3221
SECRETION, 3216
ULTRASONOGRAPHY, 3226
OBSTRUCTION
BICARBONATE SECRETION, 2776
SECRETION, 2776
PATHOLOGY, 2948
PEPTIDES
ATROPINE, 2758
DRUG EFFECTS ON, 2758
VAGOTOMY, 2758
PHOSPHOLIPIDS
SYNTHESIS, 2766
PSEUDOCYSTS
ALCOHOLISM, 3225
DIAGNOSIS, 3225
HEMORRHAGE, 3225
SECRETION, 2749*
ALCOHOLISM, 2757, 3223
AMYLASES, 2750*, 2760
BILE, 3212*
CALCIUM, 2761
CARBOHYDRATES, 2768
DRUG EFFECTS ON, 2750*, 2758, 2759, 2764, 2767
ENTERECTOMY, 2777
ENZYMES, 2764, 2767
FEEDING, 2756
GLYCOPROTEINS, 2768
HORMONE EFFECTS ON, 2760, 2763
LIPASE, 2765
MAGNESIUM, 2761
NEOPLASMS, 3212*
PEPTIDES, 2758
SECRETIN, 2759, 2772
VAGOTOMY, 2758
SULFATES
AUTORADIOGRAPHY, 2773
TOMOGRAPHY, 2986
TRANSPLANTATION
TECHNIQUES, 2947
ULTRASTRUCTURE, 2754

PANCREAS FUNCTION TESTS
DIGESTION
PROTEINS, 3224
ENZYMES, 2950*
GASTROINTESTINAL DISEASES
DIAGNOSIS, 3220
LIPASE, 2950*
PANCREATIC DISEASES
DIAGNOSIS, 3220, 3224
PEPTIDES, 3220
PHOSPHOLIPASE, 2950*
TECHNIQUES, 3224
TRYPSIN, 2950*

PANCREATECTOMY
PLASMA
SECRETIN, 3219

PANCREATIC DISEASES
ALCOHOLISM
PATHOLOGY, 3217

PANCREATIC DISEASES (continued)
AMYLASES
ISOENZYMES, 3010
DIAGNOSIS
ALKALINE PHOSPHATASE, 2982
AMYLASES, 2982, 3010
ENDOSCOPY, 3008
FECES, 2982
HORMONES, 3215
PANCREAS FUNCTION TESTS, 3220, 3224
PANCREATOGRAPHY, 3008
SCANNING, SCINTILLATION, 3214
TOMOGRAPHY, 2986, 3008, 3214
ULTRASONOGRAPHY, 3008, 3214
DIGESTION
PROTEINS, 3224
DRUG THERAPY
H2 RECEPTOR ANTAGONISTS, 3228*
INTESTINAL ABSORPTION
VITAMIN B12, 2724*
INTESTINE, SMALL
PROTEINS, 2769
INTESTINES
CHYMOTRYPSIN, 3218
MALABSORPTION SYNDROMES
VITAMIN B12, 2724*
VITAMIN B12
BINDING, 2724*

PANCREATIC DUCT
CELL CULTURE
TECHNIQUES, 2753
OBSTRUCTION
BICARBONATE SECRETION, 2776
DIAGNOSIS, 3236
SECRETION, 2776
PRESSURE STUDY
FEEDING, 2756
REFLUX
FEEDING, 2756
PANCREATITIS, 2756
ULTRASTRUCTURE, 2754

PANCREATITIS
ALCOHOLISM, 2757
AMYLASES, 3229*
CLEARANCE STUDY, 3238
ISOENZYMES, 3010
BACTERIAL INFECTIONS
DIAGNOSIS, 3231*
CHILD
DIAGNOSIS, 3237
THERAPY, 3244
COMPLICATIONS
BACTERIAL INFECTIONS, 3231*
DIAGNOSIS, 2978, 3239
AMYLASES, 3010
CLEARANCE STUDY, 3238
ENDOSCOPY, 3009
MORPHOLOGY, 3009
PANCREATOGRAPHY, 3009
RADIOLOGY, 3009
TECHNIQUES, 3237
DIAPHRAGM
ANOMALY, 3436
DRUG EFFECTS ON
ANTINEOPLASTIC AGENTS, 2751*

PANCREATITIS (continued)
DRUG THERAPY, 3249
ANTIBIOTICS, 3239
ANTINEOPLASTIC AGENTS, 2751*
DIURETICS, 3239
THYROCALCITONIN, 2760
ENTEROKINASE
PREVENTION, 2775
FAMILIAL FACTORS, 3230*
GENETIC FACTORS, 3230*
HEMORRHAGE
SURGERY, 3251
THERAPY, 3251
NECROSIS
THERAPY, 3246
ODDI'S SPHINCTER
ENDOSCOPY, 3352*
PANCREATIC DUCT
REFLUX, 2756
PHOSPHOLIPASE, 3229*
PREVENTION
DRUGS, 2752*
STOMACH
HYPOTHERMIA, 3244
THERAPY, 3248
COMPLICATIONS, 3243
GLUCOSE, 3246
HYPOTHERMIA, 3240, 3244, 3245
REVIEW, 3242

PANCREATITIS, CHRONIC
CALCIFICATION
RADIOLOGY, 3234
CHILD
DIAGNOSIS, 3237
DIAGNOSIS
BIOCHEMISTRY, 3236
CHOLANGIOGRAPHY, 3234
PANCREATOGRAPHY, 3234
RADIOLOGY, 3234, 3235, 3236
TECHNIQUES, 3237
ULTRASONOGRAPHY, 3234
DIET
THERAPY, 3247
DRUG THERAPY, 3250
ENZYMES, 3425
SECRETION, 3428
ENDOSCOPY
PANCREATOGRAPHY, 3233
HYPERAMYLASEMIA
ISOZYMES, 3232*
PANCREATOGRAPHY
CLASSIFICATION, 3233
SURGERY
SEQUELAE, 3360*

PANCREATOGRAPHY
PANCREAS
ENDOSCOPY, 3009
PANCREATIC DISEASES
DIAGNOSIS, 3008
PANCREATITIS
DIAGNOSIS, 3009
PANCREATITIS, CHRONIC
CLASSIFICATION, 3233
DIAGNOSIS, 3234
ENDOSCOPY, 3233

PANCREOZYMIN
RADIOIMMUNOASSAY
PEPTIDES, 2915
TECHNIQUES, 2915
SECRETION
BILE, 2798*
HORMONE EFFECTS ON, 2887
SOMATOSTATIN, 2887

PARASITES AND PARASITIC DISEASES
IMMUNITY, 2917
IMMUNOLOGY, 2917

PARASYMPATHOLYTICS
ODDI'S SPHINCTER
MANOMETRY, 2694
ULCER, PEPTIC
DRUG THERAPY, 3078

PARATHYROID GLANDS
MORPHOLOGY
GASTRIN, 2727*

PARATYPHOID FEVERS
SEE SALMONELLOSIS

PARENTERAL ALIMENTATION
AMINES
SYNTHESIS, 2932
ANTRUM
GASTRIN, 2932
COMPLICATIONS, 3410*
CROHN'S DISEASE
THERAPY, 3467*
GASTROINTESTINAL SYSTEM
SURGERY, 3429
NUTRITION DISORDERS
THERAPY, 3467*
SECRETION
GASTRIN, 2932
SERUM
GASTRIN, 2932
ZINC
DEFICIENCY, 3410*

PELIOSIS HEPATIS
DIAGNOSIS, 3292

PENTAGASTRIN
ACID SECRETION
ADRENERGIC RECEPTOR BLOCKADERS, 2725*
HORMONE EFFECTS ON, 2736
STOMACH
ACID SECRETION, 2736
MOTILITY, 2703

PEPSIN
SECRETION
HORMONE EFFECTS ON, 2738
HORMONES, GASTROINTESTINAL, 2738
PURINES, 2745
STOMACH
NUTRITION DISORDERS, 3418
SECRETION, 2738, 2745

PEPSINOGEN
SERUM
HEMODIALYSIS, 3112

PEPTIC ULCER
SEE ULCER, PEPTIC

PEPTIDE HYDROLASES
INTESTINAL ABSORPTION
VITAMIN B12, 2724*
MALABSORPTION SYNDROMES
VITAMIN B12, 2724*
STOMACH
ANTACIDS, 3423
DRUG EFFECTS ON, 3423
VITAMIN B12
BINDING, 2724*

PEPTIDES
CHOLECYSTOKININ
RADIOIMMUNOASSAY, 2915
PANCREAS
ATROPINE, 2758
DRUG EFFECTS ON, 2750*, 2758
ELECTROPHYSIOLOGY, 2750*
SECRETION, 2758
VAGOTOMY, 2758
PANCREAS FUNCTION TESTS, 3220
PANCREOZYMIN
RADIOIMMUNOASSAY, 2915

PERFORATION
AMEBIASIS
COMPLICATIONS, 3460
COLITIS
AMEBIASIS, 3460
COMPLICATIONS, 3460
INTESTINE, SMALL
HERNIA, 3151
NEOPLASM METASTASIS, 3165
WOUNDS AND INJURIES, 3151
JEJUNUM
NEOPLASM METASTASIS, 3165
STOMACH
ULCER, PEPTIC, 3080
ULCER
STRESS, 3116
ULCER, PEPTIC
SURGERY, 3080
SURVIVAL, 3080
THERAPY, 3080

PERFUSION
HEME
PORPHYRIA, 3260*
LIVER
PLASMA, 2803
PROGNOSIS, 3286
LIVER COMA
PROGNOSIS, 3286

PERISTALSIS
ESOPHAGUS
TECHNIQUES, 2700

PERITONITIS
BILE
PROGNOSIS, 3368
DRUG THERAPY
TRYPSIN INHIBITORS, 3445
INTESTINAL ABSORPTION
GLUCOSE, 2670

PETIDASE
SEE PEPTIDE HYDROLASES

PHAGOCYTOSIS
INTESTINES
CELLS, 2868*

PHENOBARBITAL
CHOLESTASIS
DRUG THERAPY, 3397

PHOSPHATASE, ALKALINE
SEE ALKALINE PHOSPHATASE

PHOSPHATIDES
SEE PHOSPHOLIPIDS

PHOSPHOLIPASE
PANCREAS FUNCTION TESTS, 2950*
PANCREATITIS, 3229*

PHOSPHOLIPIDS
BILE
LIPIDS, 3382
CHOLELITHIASIS
DRUG THERAPY, 3382
INTESTINAL ABSORPTION
BILE ACIDS AND SALTS, 2654*
LIVER
DIETARY FACTORS, 2834
FEEDING, 2834
PANCREAS
SYNTHESIS, 2766

PHOTOTHERAPY
CRIGLER-NAJJAR SYNDROME
INFANT, 3299*

PHYSICAL ACTIVITY
BILE
LIPIDS, 2821
ERYTHROCYTES
LIPIDS, 2821
PLASMA
ACYLTRANSFERASES, 2821

PIGMENTS
GALLSTONES
GROWTH SUBSTANCES, 3384

PITUITARY GLAND
TRANSPORT
BILE ACIDS AND SALTS, 2850
SULFOBROMOPHTHALEIN, 2850

PLASMA
ACYLTRANSFERASES
PHYSICAL ACTIVITY, 2821
LIPIDS
FIBERS, 2908*
LIVER
PERFUSION, 2803
LIVER COMA
REGENERATION, 2861
MOTILIN
AGE FACTORS, 2914
INFANT, 2914
SECRETIN
PANCREATECTOMY, 3219

PLASMA (continued)
STEROLS
DIETARY FACTORS, 2908*
FIBERS, 2908*

PLATELETS
SEE BLOOD PLATELETS

POLYPS
CECUM
DIAGNOSIS, 3166
RADIOLOGY, 3166
COLON
DIAGNOSIS, 3186*
DUODENUM, 3187*
ENDOSCOPY, 3186*
FECES, 3186*
RADIOLOGY, 3186*
ILEUM
DIAGNOSIS, 3166
RADIOLOGY, 3166

PORPHYRIA
BIOCHEMISTRY, 3293
HEME
COMA, 3260*
HYPERTENSION, 3260*
PERFUSION, 3260*
PATHOLOGY, 3293
THERAPY, 3293

PORTACAVAL SHUNT
BILE ACIDS AND SALTS
METABOLISM, 2827
CHOLESTEROL
SYNTHESIS, 2831
FATTY ACIDS
SYNTHESIS, 2831
LIPIDS
METABOLISM, 2847
LIVER
REGENERATION, 3339*
LIVER CIRRHOSIS
PROGNOSIS, 3345
SURVIVAL, 3345
SHOCK, 2946
SLEEP, 2945

PORTAL HYPERTENSION
SEE HYPERTENSION, PORTAL

POTASSIUM
ILEUM
ION TRANSPORT, 2685
INTESTINE, SMALL
ION TRANSPORT, 2685

PRECANCEROUS CONDITIONS
COLON
DIAGNOSIS, 2953*
GARDNER'S SYNDROME, 2953*
CROHN'S DISEASE
SURGERY, 3463*
RECTUM
DIAGNOSIS, 2953*
GARDNER'S SYNDROME, 2953*
STOMACH
GASTRITIS, ATROPHIC, 3065
MORPHOLOGY, 3133
VAGOTOMY, 3133

PREGNANCY
MELENA
RISK FACTORS, 3444
NEONATE
MELENA, 3444

PROCTITIS
DIARRHEA
DRUG THERAPY, 3405*
IRRITABLE COLON
PATHOLOGY, 3185*

PROLAPSE
RECTUM
SURGERY, 3191
THERAPY, 3191

PROSTAGLANDINS
DIARRHEA
DRUG-INDUCED, 3407*
ESOPHAGITIS
MOTILITY, 3038
ESOPHAGUS
MOTILITY, 3038
GASTROINTESTINAL SYSTEM, 2629*
MUSCLES, 2629*
STOMACH
ACID SECRETION, 2732
MOTILITY, 2707
ULCER, PEPTIC
DRUG THERAPY, 3078

PROTEASE
SEE PEPTIDE HYDROLASES

PROTEINS
DIGESTION
PANCREAS FUNCTION TESTS, 3224
PANCREATIC DISEASES, 3224
INTESTINE, SMALL
NEONATE, 2877*
PANCREATIC DISEASES, 2769
IRON
BINDING, 2890
LIVER
SYNTHESIS, 2860
LIVER DISEASES
TOXICITY, 3264
PANCREAS
DIGESTION, 2770
SALIVARY GLANDS
SYNTHESIS, 2714
STOMACH
ACID SECRETION, 3111
SYNTHESIS
DIETARY FACTORS, 2860

PSEUDO-OBSTRUCTION
INTESTINES
ELECTROPHYSIOLOGY, 3146*, 3147*
MOTILITY, 3146*, 3147*

PSEUDOCYSTS
PANCREAS
ALCOHOLISM, 3225
DIAGNOSIS, 3225
HEMORRHAGE, 3225

PURINES
INTESTINE, SMALL
METABOLISM, 2870*
JEJUNUM
METABOLISM, 2870*
SECRETION
PEPSIN, 2745
STOMACH
ACID SECRETION, 2745

PYLOROPLASTY
EXCRETION
FATS, 3104*
FECES
FATS, 3104*
STOMACH
MOTILITY, 2679*
TECHNIQUES, 3104*

PYLORUS
ANOMALY
ETIOLOGY, 3075
MOTILITY
HISTAMINE, 2690
STENOSIS
AGE FACTORS, 3050*
DIAGNOSIS, 3073
ETHNIC FACTORS, 3050*
HYPERTROPHY, 3073
INFANT, 3073
RECURRENCE, 3050*
RISK FACTORS, 3050*
SEX FACTORS, 3050*
TUBERCULOSIS, 3074
ULCER
ETIOLOGY, 3055*

RADIOIMMUNOASSAY
AUSTRALIA ANTIGEN
TECHNIQUES, 3313
BILE ACIDS AND SALTS
KINETICS, 3336*
TECHNIQUES, 2963*, 2964*
CHOLECYSTOKININ
PEPTIDES, 2915
TECHNIQUES, 2915
PANCREOZYMIN
PEPTIDES, 2915
TECHNIQUES, 2915
SERUM
BILE ACIDS AND SALTS, 2962*, 2963*
TRYPSIN, 2774
TRYPSIN
TECHNIQUES, 2774

RADIOLOGY
CECUM
POLYPS, 3166
CHOLECYSTITIS
REVIEW, 3381
CHOLELITHIASIS
REVIEW, 3381
COLITIS, ULCERATIVE, 3210
COLON
AMINO ACIDS, 2973
BARIUM, 3188*
POLYPS, 3186*
TECHNIQUES, 2973, 2979

RADIOLOGY (continued)
DUODENUM
HEMORRHAGE, 2981
OBSTRUCTION, 2980
STENOSIS, 2980
TECHNIQUES, 2965
ESOPHAGEAL DISEASES
DIAGNOSIS, 2993
REVIEW, 2993
ESOPHAGEAL REFLUX
DIAGNOSIS, 3032
ESOPHAGUS
HEMORRHAGE, 2981, 3447
MOTILITY, 2993
GALLBLADDER, 2969
ANOMALY, 3377
GALLBLADDER DISEASES
DIAGNOSIS, 2969
GASTRECTOMY, 3091
GASTROINTESTINAL SYSTEM, 2991
HEMORRHAGE, 3448
HEMORRHAGE
ENDOSCOPY, 3448
ILEUM
POLYPS, 3166
INFLAMMATORY BOWEL DISEASES
DIAGNOSIS, 3188*
INTESTINE, SMALL, 2991
HEMORRHAGE, 3447
OBSTRUCTION, 2980
LIVER
LIPOMA, 3274
ODDI'S SPHINCTER
TECHNIQUES, 2692
PANCREAS
MORPHOLOGY, 3009
PANCREATITIS
DIAGNOSIS, 3009
PANCREATITIS, CHRONIC
CALCIFICATION, 3234
DIAGNOSIS, 3234, 3235, 3236
STOMACH, 2987, 2991
CONTRAST MEDIA, 2967
HEMORRHAGE, 2981, 3447
LYMPHOMA, 3044*
MORPHOLOGY, 2638*
NEOPLASMS, MALIGNANT, 2976, 3043*
TECHNIQUES, 2967
ULCER, PEPTIC, 2955*
VAGOTOMY, 3061
STOMACH DISEASES
DIAGNOSIS, 2967, 2987
ULCER, PEPTIC
DIAGNOSIS, 2955*

RADIONUCLIDES
HEMOGLOBINS
SYNTHESIS, 3419
IRON
METABOLISM, 3419

RADIOTHERAPY
LIVER
NEOPLASM METASTASIS, 3270
NEOPLASMS, MALIGNANT, 3270
STOMACH
ULCER, PEPTIC, 3117

RECTUM
BURNS, CHEMICAL, 3205
CARCINOID TUMOR
IMMUNOLOGY, 3183*
GRANULOMA
DRUG-INDUCED, 3190
MOTILITY
CALCIUM, 2687
DRUG EFFECTS ON, 2687
ION TRANSPORT, 2687
NEOPLASM METASTASIS
DIAGNOSIS, 2974
LYMPHOGRAPHY, 2974
SCANNING, SCINTILLATION, 2974
NEOPLASMS, MALIGNANT
DIAGNOSIS, 2953*, 2954*
DRUG THERAPY, 3181*, 3182*, 3202
SURVIVAL, 3202
THERAPY, 3202
PRECANCEROUS CONDITIONS
DIAGNOSIS, 2953*
GARDNER'S SYNDROME, 2953*
PROLAPSE
SURGERY, 3191
THERAPY, 3191
SURGERY
ANTIBIOTICS, 3194

REFLUX
ESOPHAGUS
ANTACIDS, 3034
DRUG THERAPY, 3034
THERAPY, 3034
GASTRECTOMY
BILE, 3006
COMPLICATIONS, 3006
GASTRITIS
BILE, 3048*
PANCREATIC DUCT
FEEDING, 2756
PANCREATITIS, 2756
STOMACH
ACID SECRETION, 2730
ULCER, 3087
ULCER
STRESS, 3087

REGIONAL ENTERITIS
SEE ENTERITIS, REGIONAL

RENIN
LIVER CIRRHOSIS
ASCITES, 3342

RESPIRATORY SYSTEM
AMEBIASIS
DIAGNOSIS, 3454*
GASTROSTOMY
COMPLICATIONS, 3059
LIVER DISEASES
COMPLICATIONS, 3253*

REYE'S SYNDROME
DIAGNOSIS, 3294
THERAPY, 3294

SALIVA
AMYLASES, 2713
ENZYMES, 2718

SALIVARY GLANDS
CATALASE, 2716
HYPERPLASIA, 2717
PROTEINS
SYNTHESIS, 2714

SCANNING, SCINTILLATION
BILIRUBIN
TECHNIQUES, 2848
ESOPHAGEAL REFLUX
TECHNIQUES, 3021*
THERAPY, 3021*
JAUNDICE, CHOLESTATIC
DIAGNOSIS, 3401
LIVER
ECHINOCOCCOSIS, 3284
LIVER DISEASES
CIRCULATION, 3337*
PANCREATIC DISEASES
DIAGNOSIS, 3214
RECTUM
NEOPLASM METASTASIS, 2974
SPLEEN
LIVER DISEASES, 3337*
STOMACH, 2968
STOMACH DISEASES
DIAGNOSIS, 2968

SCLEROSIS
LIVER, 3291

SECRETIN
ACID SECRETION
HORMONE EFFECTS ON, 2736
FEEDING, 2771, 3114
GASTROINTESTINAL SYSTEM, 2720*
KINETICS, 2930
PANCREAS
BICARBONATE SECRETION, 2771
SECRETION, 2759, 2772
PLASMA
PANCREATECTOMY, 3219
SECRETION
ATROPINE, 2759
BILE, 2798*
DRUG EFFECTS ON, 2759
HORMONE EFFECTS ON, 2772
SOMATOSTATIN, 2772
STOMACH
ACID SECRETION, 2736
ZOLLINGER-ELLISON SYNDROME
DIAGNOSIS, 3413*

SECRETION
SEE ALSO ACID SECRETION, BICARBONATE SECRETION
AMYLASES
DRUG EFFECTS ON, 2750*
ANUS
LIPIDS, 2889
BILE, 2813
CHOLECYSTOKININ, 2798*
ESTROGENS, 2826
HORMONE EFFECTS ON, 2798*, 2826
PANCREOZYMIN, 2798*
SECRETIN, 2798*
BILE ACIDS AND SALTS
DIETARY FACTORS, 2823
FETUS, 2824

SECRETION (continued)
BILE ACIDS AND SALTS (continued)
STEROIDS, 2824
BILIARY TRACT, 2813
HORMONE EFFECTS ON, 2763, 2826
CHOLESTEROL
CHOLELITHIASIS, 3394
DIETARY FACTORS, 2823
COLON
HORMONE EFFECTS ON, 2888
HORMONES, GASTROINTESTINAL, 2888
SOMATOSTATIN, 2888
DUMPING SYNDROME
DRUG THERAPY, 3428
DUODENITIS
DRUG THERAPY, 3428
DUODENUM
ULCER, PEPTIC, 3428
GASTRIN
ANTIEMETICS, 3103*
CIRCADIAN RHYTHM, 2748
DRUG EFFECTS ON, 3103*
JEJUNUM, 2746
PARENTERAL ALIMENTATION, 2932
STARVATION, 2748
STRESS, 2932
ULCER, PEPTIC, 3103*
HEPATOCYTES
GALACTOSAMINE, 2801*
ILEUM
INTESTINE, SMALL, 2637*
INTESTINAL OBSTRUCTION, 2898*
INTESTINE, SMALL, 2882
ADENYL CYCLASE, 2873*
ANTIBODIES, 2883
CELLS, 2637*, 2883
HORMONE EFFECTS ON, 2873*
IMMUNOLOGY, 2883
MUCUS, 2883
PRESSURE STUDY, 2867*
INTRINSIC FACTOR
VAGOTOMY, 3105*
JEJUNUM
PRESSURE STUDY, 2867*
MOTILIN
AGE FACTORS, 2914
INFANT, 2914
PANCREAS, 2749*
ALCOHOLISM, 2757, 3223
AMYLASES, 2750*, 2760
BILE, 3212*
CALCIUM, 2761
CARBOHYDRATES, 2768
DRUG EFFECTS ON, 2750*, 2758, 2759, 2764, 2767
ENTERECTOMY, 2777
ENZYMES, 2764, 2767
FEEDING, 2756
GLYCOPROTEINS, 2768
HORMONE EFFECTS ON, 2760, 2763
LIPASE, 2765
MAGNESIUM, 2761
NEOPLASMS, 3212*
NEOPLASMS, MALIGNANT, 3216
OBSTRUCTION, 2776
PEPTIDES, 2758
SECRETIN, 2759, 2772
VAGOTOMY, 2758

SECRETION (continued)
PANCREATIC DUCT
OBSTRUCTION, 2776
PANCREATITIS, CHRONIC
DRUG THERAPY, 3428
PANCREOZYMIN
HORMONE EFFECTS ON, 2887
SOMATOSTATIN, 2887
PEPSIN
HORMONE EFFECTS ON, 2738
HORMONES, GASTROINTESTINAL, 2738
PURINES, 2745
SECRETIN
ATROPINE, 2759
DRUG EFFECTS ON, 2759
HORMONE EFFECTS ON, 2772
SOMATOSTATIN, 2772
STOMACH
ADRENERGIC RECEPTOR BLOCKADERS, 2725*
DRUG EFFECTS ON, 3128
GASTRIN, 2735, 2746, 2748
HORMONE EFFECTS ON, 2763, 3102*
INTRINSIC FACTOR, 3105*
NUTRITION DISORDERS, 3418
PEPSIN, 2738, 2745
ULCER, PEPTIC, 2988, 3053*, 3102*, 3109, 3128
ULCER, PEPTIC
DIAGNOSIS, 2988
DRUG THERAPY, 3428
GASTRIN, 3053*

SEPSIS
BLOOD
SEROTONIN, 2879*

SEROTONIN
BLOOD
SEPSIS, 2879*
INTESTINAL OBSTRUCTION
BLOOD, 2879*

SERUM
ALCOHOLISM
GASTRIN, 3068
BILE ACIDS AND SALTS
RADIOIMMUNOASSAY, 2962*, 2963*
BILIARY TRACT DISEASES
BILE ACIDS AND SALTS, 2960*
CHOLESTASIS
ALKALINE PHOSPHATASE, 3334
CYSTIC FIBROSIS
ALPHA FETOPROTEIN, 3213*
FATTY ACIDS
ALCOHOLS, 2830
DRUG EFFECTS ON, 2830
TRACER STUDY, 2830
GASTRIN, 3066
ANTIEMETICS, 3103*
ANTRECTOMY, 3132
CIRCADIAN RHYTHM, 2748
DRUG EFFECTS ON, 3103*, 3125
H2 RECEPTOR ANTAGONISTS, 3125
HEMODIALYSIS, 3112
PARENTERAL ALIMENTATION, 2932
STARVATION, 2748
STRESS, 2932
ULCER, PEPTIC, 3103*
VAGOTOMY, 3132

SERUM (continued)
GASTRITIS
GASTRIN, 3067, 3068
GASTRITIS, ATROPHIC
GASTRIN, 3066
H2 RECEPTOR ANTAGONISTS
GASTRIN, 3079
HEPATITIS
AMINO TRANSFERASES, 3323
TRIGLYCERIDES, 3323
HEPATITIS, INFECTIOUS
AMINO TRANSFERASES, 3323
TRIGLYCERIDES, 3323
IMMUNOGLOBULINS
ALCOHOLISM, 2857
HYPERTENSION, PORTAL, 2857
LIVER
AMYLASES, 2809
LIVER DISEASES
BILE ACIDS AND SALTS, 2960*, 2961*
LIVER DISEASES, ALCOHOLIC
ALKALINE PHOSPHATASE, 3334
PEPSINOGEN
HEMODIALYSIS, 3112
TRYPSIN
RADIOIMMUNOASSAY, 2774
ULCER, PEPTIC
GASTRIN, 3125

SHIGELLOSIS
CHILD
EPIDEMIOLOGY, 3457*
TRANSMISSION, 3457*

SHOCK
LIVER COMA, 2946
PORTACAVAL SHUNT, 2946

SHORT BOWEL SYNDROME
HORMONES, GASTROINTESTINAL, 2863*

SHUNT, INTESTINAL
BILE
CHEMICAL COMPOSITION, 3142*
BILE DUCTS
CHOLELITHIASIS, 3142*
COMPLICATIONS
CHOLELITHIASIS, 3142*
COMMON BILE DUCT CALCULI, 3142*
HYPERLIPEMIA, 3154
DRUG THERAPY
LIVER, 2865*
INTESTINE, SMALL
HYPERPLASIA, 2864*
MORPHOLOGY, 3145*
OBESITY
DIETARY FACTORS, 3144*
ULTRASTRUCTURE, 3145*

SIGMOID
DIVERTICULUM
SURGERY, 3196
THERAPY, 3196
NEOPLASMS
HERNIA, 3201
INFLAMMATION, 3201

SLEEP
ESOPHAGEAL REFLUX, 3026
LIVER COMA, 2945
PORTACAVAL SHUNT, 2945

SMALL INTESTINE
SEE INTESTINE, SMALL

SODIUM
ILEUM
ION TRANSPORT, 2672
INTESTINE, SMALL
ION TRANSPORT, 2672

SOMATOSTATIN
COLON
SECRETION, 2888
SECRETION
PANCREOZYMIN, 2887
SECRETIN, 2772
STOMACH
ACID SECRETION, 3102*
ULCER
STRESS, 3085

SPASM
GASTROINTESTINAL SYSTEM
MUSCLES, 3427
ODDI'S SPHINCTER
DRUG EFFECTS ON, 3427

SPHINCTER
ESOPHAGEAL REFLUX, 3029
ESOPHAGUS, 3029
MOTILITY, 2673*, 3038
NERVOUS CONTROL, 2673*
PRESSURE STUDY, 3027

SPLEEN
CYSTS
COMPLICATIONS, 3440
LIVER CIRRHOSIS
IMMUNOLOGY, 2939
SCANNING, SCINTILLATION
LIVER DISEASES, 3337*

SPLENECTOMY
HYPERTENSION, PORTAL
THERAPY, 3343

SPLENORENAL SHUNT
LIVER COMA, 3346
SURVIVAL, 3346

SPRUE
DIAGNOSIS
ORGAN CULTURE, 2997

STARVATION
HEPATOCYTES
ATROPHY, 2859
LIPIDS, 2859
ULTRASTRUCTURE, 2859
INTESTINE, SMALL
HYPERPLASIA, 2748
JEJUNUM
HYPERPLASIA, 2748
LIVER
ATROPHY, 2859

STARVATION (continued)
LIVER (continued)
LIPIDS, 2859
ULTRASTRUCTURE, 2859
SECRETION
GASTRIN, 2748
SERUM
GASTRIN, 2748

STEATOSIS
SEE FATTY LIVER

STENOSIS
DUODENUM
ANGIOGRAPHY, 2980
DIAGNOSIS, 2980
RADIOLOGY, 2980
PYLORUS
AGE FACTORS, 3050*
DIAGNOSIS, 3073
ETHNIC FACTORS, 3050*
HYPERTROPHY, 3073
INFANT, 3073
RECURRENCE, 3050*
RISK FACTORS, 3050*
SEX FACTORS, 3050*
TUBERCULOSIS, 3074
VATER'S AMPULLA
DIAGNOSIS, 3402
ENDOSCOPY, 3376
THERAPY, 3376, 3402

STEROIDS
BILE ACIDS AND SALTS
SYNTHESIS, 2822, 2824
CHROMATOGRAPHY
TECHNIQUES, 2925
DIETARY FACTORS
FIBERS, 2908*
FECES
CHROMATOGRAPHY, 2925
DIETARY FACTORS, 2908*
FIBERS, 2908*
SECRETION
BILE ACIDS AND SALTS, 2824
STOMACH
DRUG EFFECTS ON, 2743
HORMONE EFFECTS ON, 2743

STEROLS
BILE
CHOLESTEROL, 3388
CHOLELITHIASIS
BILE ACIDS AND SALTS, 3388
DIETARY FACTORS, 3386
DRUG THERAPY, 3388
DIETARY FACTORS
FIBERS, 2908*
ILEUM
SYNTHESIS, 2876*
INTESTINE, SMALL
SYNTHESIS, 2876*
PLASMA
DIETARY FACTORS, 2908*
FIBERS, 2908*

STOMACH
ACID SECRETION
ADRENERGIC RECEPTOR AGONISTS, 2733

STOMACH (continued)
ACID SECRETION (continued)
ADRENERGIC RECEPTOR BLOCKADERS, 2733
AMINO ACIDS, 2742
ANTACIDS, 3122
CALCIUM, 2741
CHOLECYSTOKININ, 2736
DISTENTION, 2739
DRUG EFFECTS ON, 2729, 3100*, 3122, 3124, 3127
GASTRIN, 3111
H2 RECEPTOR ANTAGONISTS, 2729, 3122, 3124
HISTAMINE, 2734
HORMONE EFFECTS ON, 2736, 3102*
INSULIN, 3004
ION TRANSPORT, 2728, 2730
JEJUNUM, 2746
MITOSIS, 3071
NUTRITION DISORDERS, 3418
PENTAGASTRIN, 2736
PROSTAGLANDINS, 2732
PROTEINS, 3111
PURINES, 2745
REFLUX, 2730
SECRETIN, 2736
SOMATOSTATIN, 3102*
ULCER, PEPTIC, 2988, 3102*, 3111
VAGOTOMY, 2747, 3004, 3007
ZOLLINGER-ELLISON SYNDROME, 3446
ACIDITY
NUTRITION DISORDERS, 3418
ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
SYNTHESIS, 2737
ANTIGENS, 2929
BIOPSY
TECHNIQUES, 3003
BLEEDING
LASER, 2922
THERAPY, 2922
CELLS
MITOSIS, 3071
VAGOTOMY, 2726*
CHOLELITHIASIS
MOTILITY, 3356*
CYTOLOGY
ANOMALY, 3056*
DIGESTION
ANTACIDS, 3423
DRUG EFFECTS ON, 3423
DRUG EFFECTS ON
ASPIRIN, 2721*
HORMONES, ADRENAL CORTEX, 2743
STEROIDS, 2743
ELECTROPHYSIOLOGY
VAGOTOMY, 3061
ENDOSCOPY, 2983, 2985, 2991
GASTRIN, 3066
BINDING, 2731
CELLS, 2644
SYNTHESIS, 2740, 2744
GASTRITIS, ATROPHIC
GASTRIN, 3066
GLUCOSE
METABOLISM, 3057*
GLUCURONIDASE
NEOPLASMS, MALIGNANT, 3045*
ULCER, PEPTIC, 3045*
STOMACH (continued)
GLYCOLYSIS
NEOPLASMS, MALIGNANT, 3057*
ULCER, PEPTIC, 3057*
GUANYL CYCLASE
DRUG EFFECTS ON, 2722*
HORMONE EFFECTS ON, 2722*
HEMORRHAGE, 3450
DIAGNOSIS, 2981, 3447, 3449
ENDOSCOPY, 2981
RADIOLOGY, 2981, 3447
THERAPY, 3447, 3449
HORMONE EFFECTS ON
HORMONES, ADRENAL CORTEX, 2743
STEROIDS, 2743
HYPERCHLORHYDRIA
ZOLLINGER-ELLISON SYNDROME, 3446
HYPOTHERMIA
PANCREATITIS, 3244
IMMUNOLOGY
ULCER, PEPTIC, 3115
INTRINSIC FACTOR
VAGOTOMY, 3105*
ION TRANSPORT
BILE ACIDS AND SALTS, 2723*
CALCIUM, 2707
CHENODEOXYCHOLIC ACID, 2723*
DRUG EFFECTS ON, 2723*
LYMPHOMA
RADIOLOGY, 3044*
MENETRIER'S DISEASE
NEOPLASMS, 3049*
ULCER, 3049*
METAPLASIA
MORPHOLOGY, 2639*
MITOSIS
DRUG EFFECTS ON, 3051*
ULCER, PEPTIC, 3051*
MORPHOLOGY
ANOMALY, 3056*
BARIUM, 2638*
PRECANCEROUS CONDITIONS, 3133
RADIOLOGY, 2638*
VAGOTOMY, 3133
MOTILITY
ANTRECTOMY, 2679*, 3132
CALCIUM, 2707
CHOLECYSTOKININ, 2681*
DISTENTION, 2681*
DRUG EFFECTS ON, 2681*, 2683*, 2690, 2707
ELECTRICAL CONTROL, 2680*, 2683*, 2699
ESOPHAGEAL REFLUX, 3023*
ESOPHAGITIS, 3023*
GASTRIN, 2698
GASTRITIS, ATROPHIC, 3005
HISTAMINE, 2690
HORMONE CONTROL, 2698
HORMONE EFFECTS ON, 2682*, 2698, 2703
ION TRANSPORT, 2707
MOTILIN, 2698
NERVOUS CONTROL, 2679*, 2680*, 2683*, 2701, 2706
PENTAGASTRIN, 2703
PROSTAGLANDINS, 2707
PYLOROPLASTY, 2679*
ULCER, PEPTIC, 3094*, 3113

STOMACH (continued)
MOTILITY (continued)
VAGOTOMY, 2679*, 2701, 2708, 2709, 3061, 3132
MUCUS
BARIUM, 2921
CONTRAST MEDIA, 2921
DRUG EFFECTS ON, 3051*
ULCER, PEPTIC, 3051*
MUSCLES
MOTILITY, 2674*
NEOPLASMS
DIAGNOSIS, 3076
DRUG THERAPY, 3090
ENDOSCOPY, 3076
PROGNOSIS, 3093
SURGERY, 3093
NEOPLASMS, BENIGN
CARCINOEMBRYONIC ANTIGEN, 3064
NEOPLASMS, MALIGNANT
AGE FACTORS, 3092
ANGIOGRAPHY, 2972
BIOPSY, 3003, 3043*
CARCINOEMBRYONIC ANTIGEN, 3064
CYTOLOGY, 3003, 3043*
DIAGNOSIS, 2972, 2976, 2977, 3003, 3043*, 3092
ENDOSCOPY, 2976, 2977, 3003, 3043*
ENZYMES, 3046*
RADIOLOGY, 2976, 3043*
THERAPY, 3092
PEPSIN
NUTRITION DISORDERS, 3418
PEPTIDE HYDROLASES
ANTACIDS, 3423
DRUG EFFECTS ON, 3423
PRECANCEROUS CONDITIONS
GASTRITIS, ATROPHIC, 3065
VAGOTOMY, 3133
RADIOLOGY, 2987, 2991
CONTRAST MEDIA, 2967
TECHNIQUES, 2967
VAGOTOMY, 3061
REFLUX
ULCER, 3087
SCANNING, SCINTILLATION, 2968
SECRETION
ADRENERGIC RECEPTOR BLOCKADERS, 2725*
DRUG EFFECTS ON, 3128
GASTRIN, 2735, 2746, 2748
HORMONE EFFECTS ON, 2763, 3102*
INTRINSIC FACTOR, 3105*
NUTRITION DISORDERS, 3418
PEPSIN, 2738, 2745
ULCER, PEPTIC, 2988, 3102*, 3109, 3128
SURGERY
COMPLICATIONS, 3192
TECHNIQUES, 3060
ULCER
ETIOLOGY, 3082
PREVENTION, 2934
STRESS, 2934, 3085, 3086, 3116
ULCER, PEPTIC
ACID SECRETION, 3053*
ANTINEOPLASTIC AGENTS, 3054*
DIAGNOSIS, 2955*
DRUG-INDUCED, 3054*

STOMACH (continued)
ULCER, PEPTIC (continued)
DRUG THERAPY, 3051*, 3078, 3079, 3083, 3084
ENDOSCOPY, 2955*
GASTRIN, 2644
H2 RECEPTOR ANTAGONISTS, 3079, 3083, 3084
HEALING, 3081
HYPERPLASIA, 2644
MORPHOLOGY, 3056*
PERFORATION, 3080
RADIOLOGY, 2955*
RADIOTHERAPY, 3117
SECRETION, 3053*
VAGOTOMY, 3129
VARICES
DIAGNOSIS, 3076
ENDOSCOPY, 3076

STOMACH DISEASES
ANTIGENS
HISTOLOGY, 3063
IMMUNOLOGY, 3063
CARCINOEMBRYONIC ANTIGEN, 3064
HISTOLOGY, 3063
IMMUNOLOGY, 3063
DIAGNOSIS
CARCINOEMBRYONIC ANTIGEN, 3042*
ENDOSCOPY, 2966, 2983, 2985
ENZYMES, 3042*
RADIOLOGY, 2967, 2987
SCANNING, SCINTILLATION, 2968
HYPERSENSITIVITY
ANTIBODIES, 3089
THERAPY
VITAMIN C, 3088

STRESS
AMINES
SYNTHESIS, 2932
ANTRUM
GASTRIN, 2932
REFLUX
ULCER, 3087
SECRETION
GASTRIN, 2932
SERUM
GASTRIN, 2932
STOMACH
ULCER, 2934, 3085, 3086, 3116
ULCER
ETIOLOGY, 3086
PERFORATION, 3116
PREVENTION, 2934, 3085
REVIEW, 3086
SOMATOSTATIN, 3085
ULCER, PEPTIC
CHOLESTYRAMINE, 3052*
PREVENTION, 3052*

STRICTURE
COMMON BILE DUCT
DIAGNOSIS, 3366*
PATHOLOGY, 3366*

SUCRASE
DIARRHEA
DEFICIENCY, 3157

SUCRASE (continued)
DUODENUM
DEFICIENCY, 3149*
INTESTINE, SMALL
DEFICIENCY, 3149*, 3157
MALABSORPTION SYNDROMES
DEFICIENCY, 3157
NUTRITION DISORDERS
DEFICIENCY, 3157

SUGAR
SEE CARBOHYDRATES

SULFATES
PANCREAS
AUTORADIOGRAPHY, 2773

SULFOBROMOPHTHALEIN
LIVER
CLEARANCE STUDY, 2849
TRANSPORT
HORMONE CONTROL, 2850
PITUITARY GLAND, 2850
THYROID GLAND, 2850

SYPHILIS
AUSTRALIA ANTIGEN
DISEASES ASSOCIATED WITH, 3327
HEPATITIS
DISEASES ASSOCIATED WITH, 3327
HEPATITIS, INFECTIOUS
DISEASES ASSOCIATED WITH, 3327

THYROCALCITONIN
PANCREAS
BICARBONATE SECRETION, 2760
PANCREATITIS
DRUG THERAPY, 2760

THYROID GLAND
TRANSPORT
BILE ACIDS AND SALTS, 2850
SULFOBROMOPHTHALEIN, 2850

TOMOGRAPHY
BILE DUCTS
DILATATION, 3399
GALLBLADDER, 2969
GALLBLADDER DISEASES
DIAGNOSIS, 2969
JAUNDICE
DIAGNOSIS, 3399
JAUNDICE, CHOLESTATIC
DIAGNOSIS, 3370
KIDNEYS
CYSTS, 3016
LIVER, 2986
CYSTS, 3016
LIVER DISEASES
DIAGNOSIS, 2986
PANCREAS, 2986
PANCREATIC DISEASES
DIAGNOSIS, 2986, 3008, 3214

TOXICITY
AFLATOXINS
FASCIOLIASIS, 2919
HEPATITIS, INFECTIOUS
HEPATOCYTES, 3321

TOXICITY (continued)
INTESTINE, SMALL
ALCOHOLS, 2886
JEJUNUM
ALCOHOLS, 2886
LIVER
EMBOLIZATION, 2778*
GALACTOSAMINE, 2840
LIVER DISEASES
LYMPHOCYTES, 3264
PROTEINS, 3264

TOXINS
COLITIS
DRUG-INDUCED, 2905*
LIVER, 3304
MICROSOMES, 3305
OCCUPATIONAL FACTORS, 3303

TOXOPLASMOSIS
LIVER
CALCIFICATION, 3018

TRANSAMINASE
SEE AMINO TRANSFERASES

TRANSPLANTATION
ANUS
SURGERY, 3195
KIDNEYS
COLONIC DISEASES, 3180*
COMPLICATIONS, 3180*, 3296
LIVER DISEASES, 3296
ULCER, PEPTIC, 3097*
LIVER
CIRCULATION, 3295, 3297
CLOTTING, 3263*
TECHNIQUES, 2947, 3295, 3297
PANCREAS
TECHNIQUES, 2947

TRANSPORT
AMINO ACIDS
ALCOHOLS, 2651*
HORMONE EFFECTS ON, 2783*
BILE
MICELLES, 2814
BILE ACIDS AND SALTS
DETERGENTS, 2826
HORMONE CONTROL, 2850
PITUITARY GLAND, 2850
THYROID GLAND, 2850
DUODENUM
CALCIUM, 2874*
FOLIC ACID
ANTI-INFLAMMATORY AGENTS, 2662*
DRUG EFFECTS ON, 2662*
GALLBLADDER
BILE ACIDS AND SALTS, 2828
GLUCOSE
ALCOHOLISM, 2651*
ALCOHOLS, 2651*
DRUG EFFECTS ON, 2651*
HEPATOCYTES
AMINO ACIDS, 2783*
ILEUM
VITAMIN C, 2653*

TRANSPORT (continued)
INTESTINE, SMALL
AMINO ACIDS, 2652*, 2657*
GLUCOSE, 2657*, 2670, 2671
LIPIDS, 2655*
MEMBRANES, 2649*
OXYGEN, 2899*
VITAMIN C, 2653*
XYLOSE, 2657*
INTESTINES
FOLIC ACID, 2662*
JEJUNUM
AMINO ACIDS, 2657*
FOLIC ACID, 2657*, 2664*
GLUCOSE, 2657*
XYLOSE, 2657*
LIVER
AMINO ACIDS, 2783*
MEMBRANES
TECHNIQUES, 2649*
SULFOBROMOPHTHALEIN
HORMONE CONTROL, 2850
PITUITARY GLAND, 2850
THYROID GLAND, 2850

TRAUMA
SEE STRESS, WOUNDS AND INJURIES

TRIGLYCERIDES
SEE ALSO FATS, LIPIDS
BILE
MENSTRUAL CYCLE, 2787*
HEPATITIS
AMINO TRANSFERASES, 3323
SERUM, 3323
HEPATITIS, INFECTIOUS
AMINO TRANSFERASES, 3323
SERUM, 3323
LIVER
ALCOHOLS, 2830
DRUG EFFECTS ON, 2830
METABOLISM, 2830, 2842
TRACER STUDY, 2830

TRYPSIN
PANCREAS FUNCTION TESTS, 2950*
RADIOIMMUNOASSAY
TECHNIQUES, 2774
SERUM
RADIOIMMUNOASSAY, 2774

TRYPSIN INHIBITORS
PERITONITIS
DRUG THERAPY, 3445

TUBERCULOSIS
BILIARY TRACT
PROGNOSIS, 3368
INTESTINES
DIAGNOSIS, 3000, 3189*
ENDOSCOPY, 3000
PYLORUS
STENOSIS, 3074

TYPHOID
SEE SALMONELLOSIS

ULCER
COLON
CROHN'S DISEASE, 3466*
ULTRASTRUCTURE, 2933
INTESTINAL OBSTRUCTION
COMPLICATIONS, 3116
MENETRIER'S DISEASE
NEOPLASMS, 3049*
STOMACH, 3049*
PREVENTION
ANTACIDS, 2934
VAGOTOMY, 2934
VITAMIN A, 2934
PYLORUS
ETIOLOGY, 3055*
REFLUX
STRESS, 3087
STOMACH
ETIOLOGY, 3082
PREVENTION, 2934
REFLUX, 3087
STRESS, 2934, 3085, 3086, 3116
STRESS
ETIOLOGY, 3086
PERFORATION, 3116
PREVENTION, 2934, 3085
REVIEW, 3086
SOMATOSTATIN, 3085
VAGOTOMY
COMPLICATIONS, 3082
ETIOLOGY, 3082

ULCER, PEPTIC
ACID SECRETION
DRUG EFFECTS ON, 3127
HORMONE EFFECTS ON, 3102*
ANTACIDS
ACID SECRETION, 3126
ANTRUM
GASTRIN, 3095*
CALCIUM
ACID SECRETION, 3126
CHILD
ETIOLOGY, 3096*
DIAGNOSIS
ACID SECRETION, 2988
ENDOSCOPY, 2955*
RADIOLOGY, 2955*
SECRETION, 2988
DRUG-INDUCED
ANTINEOPLASTIC AGENTS, 3054*
DRUG THERAPY, 3118, 3426
ANTACIDS, 3078, 3122
ENZYMES, 3425
H2 RECEPTOR ANTAGONISTS, 3078, 3083, 3084, 3099*, 3122, 3123, 3124, 3125
HEALING, 3051*
PARASYMPATHOLYTICS, 3078
PROSTAGLANDINS, 3078
REVIEW, 3078
SECRETION, 3428
DUODENUM, 3056*
ACID SECRETION, 3108
ANTACIDS, 3119, 3120, 3122, 3126
CALCIUM, 3126
DRUG THERAPY, 3078, 3098*, 3099*, 3101*, 3119, 3120, 3121, 3122, 3123, 3125, 3127, 3428

ULCER, PEPTIC (continued)
DUODENUM (continued)
GASTRECTOMY, 3134
GASTRIN, 3125
H2 RECEPTOR ANTAGONISTS, 3122, 3123, 3125
IMMUNOLOGY, 3115
MAGNESIUM, 3126
NITROGEN, 3110
SECRETION, 3428
ULTRASTRUCTURE, 3099*
VAGOTOMY, 3131
GASTRECTOMY
TECHNIQUES, 3134
GASTRIN
CELLS, 2644
H2 RECEPTOR ANTAGONISTS
REVIEW, 3124
HEALING
ANTACIDS, 3119
DRUG THERAPY, 3119, 3121
VAGOTOMY, 3081
HYPERCHLORHYDRIA, 3107
INFANT
ETIOLOGY, 3096*
KIDNEYS
TRANSPLANTATION, 3097*
MAGNESIUM
ACID SECRETION, 3126
PAIN
ANTACIDS, 3119
DRUG THERAPY, 3119
PERFORATION
SURGERY, 3080
SURVIVAL, 3080
THERAPY, 3080
PREVENTION
CHOLESTYRAMINE, 3052*
PROGNOSIS
ACID SECRETION, 3007
INSULIN, 3004
VAGOTOMY, 3004, 3007
PSYCHOLOGICAL FACTORS, 3106
RECURRENCE
VAGOTOMY, 3130
SECRETION
GASTRIN, 3053*, 3103*
SERUM
GASTRIN, 3103*, 3125
STOMACH
ACID SECRETION, 2988, 3053*, 3102*, 3111
ANTINEOPLASTIC AGENTS, 3054*
DIAGNOSIS, 2955*
DRUG-INDUCED, 3054*
DRUG THERAPY, 3051*, 3078, 3079, 3083, 3084
ENDOSCOPY, 2955*
GASTRIN, 2644
GLUCURONIDASE, 3045*
GLYCOLYSIS, 3057*
H2 RECEPTOR ANTAGONISTS, 3079, 3083, 3084
HEALING, 3081
HYPERPLASIA, 2644
IMMUNOLOGY, 3115
MITOSIS, 3051*
MORPHOLOGY, 3056*
MOTILITY, 3094*, 3113

ULCER, PEPTIC (continued)
STOMACH (continued)
MUCUS, 3051*
PERFORATION, 3080
RADIOLOGY, 2955*
RADIOTHERAPY, 3117
SECRETION, 2988, 3053*, 3102*, 3109, 3128
VAGOTOMY, 3129
STRESS
CHOLESTYRAMINE, 3052*
PREVENTION, 3052*
SURGERY
TECHNIQUES, 3134
THERAPY, 3097*
VAGOTOMY
ACID SECRETION, 3131
RECURRENCE, 3131

ULCERATIVE COLITIS
SEE COLITIS, ULCERATIVE

ULTRASONOGRAPHY
BILE DUCTS
DILATATION, 3399
REVIEW, 2648
BILIARY TRACT DISEASES
DIAGNOSIS, 2957*, 2959*
GALLBLADDER, 2958*
GALLBLADDER DISEASES
DIAGNOSIS, 2958*
JAUNDICE
DIAGNOSIS, 3399
JAUNDICE, CHOLESTATIC
DIAGNOSIS, 3401
JAUNDICE, OBSTRUCTIVE
DIAGNOSIS, 2959*
KIDNEYS
CYSTS, 3016
LIVER
ABSCESS, 3017
CYSTS, 3016
ECHINOCOCCOSIS, 3284, 3456*
PANCREAS
NEOPLASMS, MALIGNANT, 3226
PANCREATIC DISEASES
DIAGNOSIS, 3008, 3214
PANCREATITIS, CHRONIC
DIAGNOSIS, 3234

URINE
HEPATITIS
FOLIC ACID, 3325
UROGASTRONE, 2715

UROGASTRONE
URINE, 2715

UROGENITAL SYSTEM
ALCOHOLISM
SEX FACTORS, 2832
LIVER CIRRHOSIS
COMPLICATIONS, 3341
NERVOUS CONTROL, 3341

VACCINES
BACTERIAL INFECTIONS
ESCHERICHIA COLI, 2918

VACCINES (continued)
HEPATITIS, INFECTIOUS
REVIEW, 3306*
INTESTINES
BACTERIAL INFECTIONS, 2918
ESCHERICHIA COLI, 2918

VAGOTOMY
ANTRUM
MOTILITY, 2747
BILE
BILE ACIDS AND SALTS, 3393
CHOLESTEROL, 3393
LIPIDS, 3393
CHOLELITHIASIS, 3393
COMPLICATIONS
INTESTINAL OBSTRUCTION, 3192
ULCER, 3082
DUODENUM
ULCER, PEPTIC, 3131
INTESTINES
BACTERIA, 2893*
PANCREAS
PEPTIDES, 2758
SECRETION, 2758
SECRETION
INTRINSIC FACTOR, 3105*
SERUM
GASTRIN, 3132
STOMACH
ACID SECRETION, 2747, 3004, 3007
CELLS, 2726*
ELECTROPHYSIOLOGY, 3061
INTRINSIC FACTOR, 3105*
MORPHOLOGY, 3133
MOTILITY, 2679*, 2701, 2708, 2709, 3061, 3132
PRECANCEROUS CONDITIONS, 3133
RADIOLOGY, 3061
ULCER, PEPTIC, 3129
TECHNIQUES, 3060
ULCER
ETIOLOGY, 3082
PREVENTION, 2934
ULCER, PEPTIC
ACID SECRETION, 3131
HEALING, 3081
PROGNOSIS, 3004, 3007
RECURRENCE, 3130, 3131

VARICES
ESOPHAGUS
HEMORRHAGE, 3040
STOMACH
DIAGNOSIS, 3076
ENDOSCOPY, 3076

VASOACTIVE INTESTINAL PEPTIDE
SEE HORMONES, GASTROINTESTINAL

VASOPRESSIN
ESOPHAGUS
HEMORRHAGE, 3040
GASTRITIS
HEMORRHAGE, 3040
GASTROINTESTINAL SYSTEM
HEMORRHAGE, 3040
ILEUM
CIRCULATION, 2900*

VASOPRESSIN (continued)
INTESTINE, SMALL
CIRCULATION, 2900*
MESENTERY
CIRCULATION, 2944

VATER'S AMPULLA
ANOMALY, 3222
DILATATION
SEQUELAE, 3364*
ENDOSCOPY
COMPLICATIONS, 3353*
TECHNIQUES, 3376
NEOPLASMS
ENDOSCOPY, 3376
THERAPY, 3376
NEOPLASMS, MALIGNANT
DIAGNOSIS, 3380
ENDOSCOPY, 3380
STENOSIS
DIAGNOSIS, 3402
ENDOSCOPY, 3376
THERAPY, 3376, 3402

VILLI
ATROPHY
GIARDIASIS, 3459*
INTESTINE, SMALL
CIRCULATION, 2897*

VIRUS DISEASES
LIVER
CALCIFICATION, 3018

VIRUSES
GASTROENTERITIS
ULTRASTRUCTURE, 2970
INFLAMMATORY BOWEL DISEASES
ETIOLOGY, 3211

VITAMIN A
ALCOHOLISM
LIVER CIRRHOSIS, 3348
LIVER CIRRHOSIS
DRUG THERAPY, 3348
LIVER DISEASES, ALCOHOLIC
LIVER CIRRHOSIS, 3348
ULCER
PREVENTION, 2934

VITAMIN B12
BINDING
INTRINSIC FACTOR, 2724*
PANCREATIC DISEASES, 2724*
PEPTIDE HYDROLASES, 2724*
INTESTINAL ABSORPTION, 2634*
PANCREATIC DISEASES, 2724*
PEPTIDE HYDROLASES, 2724*
INTESTINE, SMALL
BACTERIAL INFECTIONS, 3137*
BINDING, 2634*
METABOLISM, 3137*
INTRINSIC FACTOR
BINDING, 2634*
KIDNEYS
HOMEOSTASIS, 2852
LIVER
HOMEOSTASIS, 2852

VITAMIN B12 (continued)
MALABSORPTION SYNDROMES
PANCREATIC DISEASES, 2724*
PEPTIDE HYDROLASES, 2724*
METABOLISM
BACTERIA, 3137*

VITAMIN C
ILEUM
TRANSPORT, 2653*
INTESTINAL ABSORPTION, 2653*
INTESTINE, SMALL
TRANSPORT, 2653*
LIVER
DEFICIENCY, 2844
SYNTHESIS, 2844
STOMACH DISEASES
THERAPY, 3088

VITAMIN D
INTESTINES
ABSORPTION, 3350
BINDING, 2878*
LIVER CIRRHOSIS
DEFICIENCY, 3351
METABOLISM, 3351
LIVER CIRRHOSIS, OBSTRUCTIVE
DEFICIENCY, 3350
DRUG THERAPY, 3349
MALABSORPTION SYNDROMES, 3350

VOLVULUS
SEE INTESTINAL OBSTRUCTION

WATER
GIARDIASIS
TRANSMISSION, 3458*

WHIPPLE'S DISEASE
SEE LIPODYSTROPHY, INTESTINAL

WOUNDS AND INJURIES
COMMON BILE DUCT, 3161
DUODENUM, 3161
INTESTINE, SMALL, 3161
PERFORATION, 3151
LIVER
HEMATOMA, 3273

XYLOSE
ABSORPTION
TECHNIQUES, 2999
INTESTINAL ABSORPTION, 2660*
ALCOHOLISM, 2668
BILE ACIDS AND SALTS, 2657*
INTESTINE, SMALL
TRANSPORT, 2657*
INTESTINES
ABSORPTION, 2999
JEJUNUM
TRANSPORT, 2657*
MALABSORPTION SYNDROMES
DIAGNOSIS, 2999

YERSINIA
ENTEROCOLITIS, 2896*

ZINC
PARENTERAL ALIMENTATION
DEFICIENCY, 3410*

ZOLLINGER-ELLISON SYNDROME
DIAGNOSIS
CALCIUM, 3413*
SECRETIN, 3413*
DRUG THERAPY
H2 RECEPTOR ANTAGONISTS, 3412*
GASTRIN
HORMONE EFFECTS ON, 3077
STOMACH
ACID SECRETION, 3446
HYPERCHLORHYDRIA, 3446

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